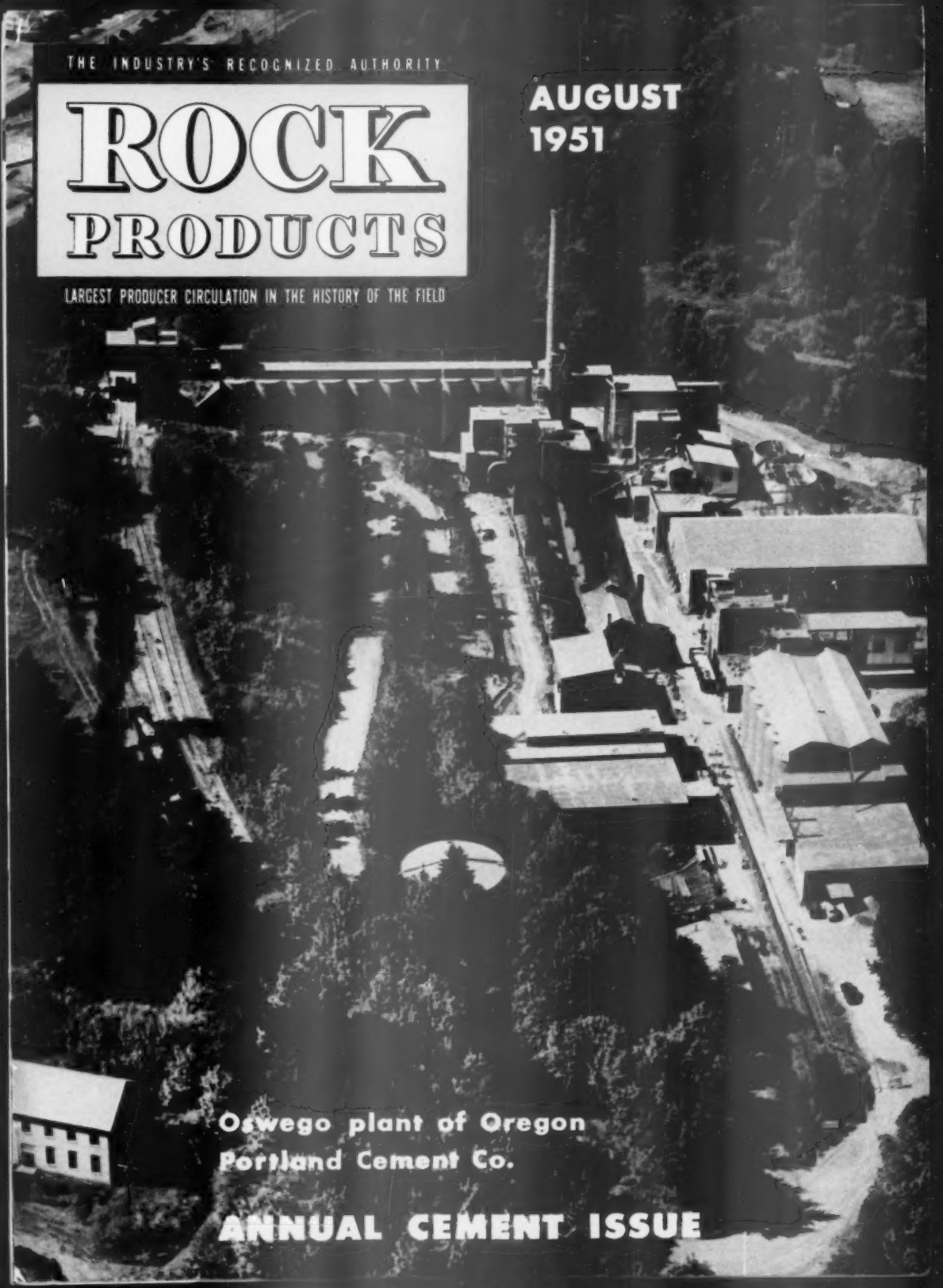
THE INDUSTRY'S RECOGNIZED AUTHORITY

# ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

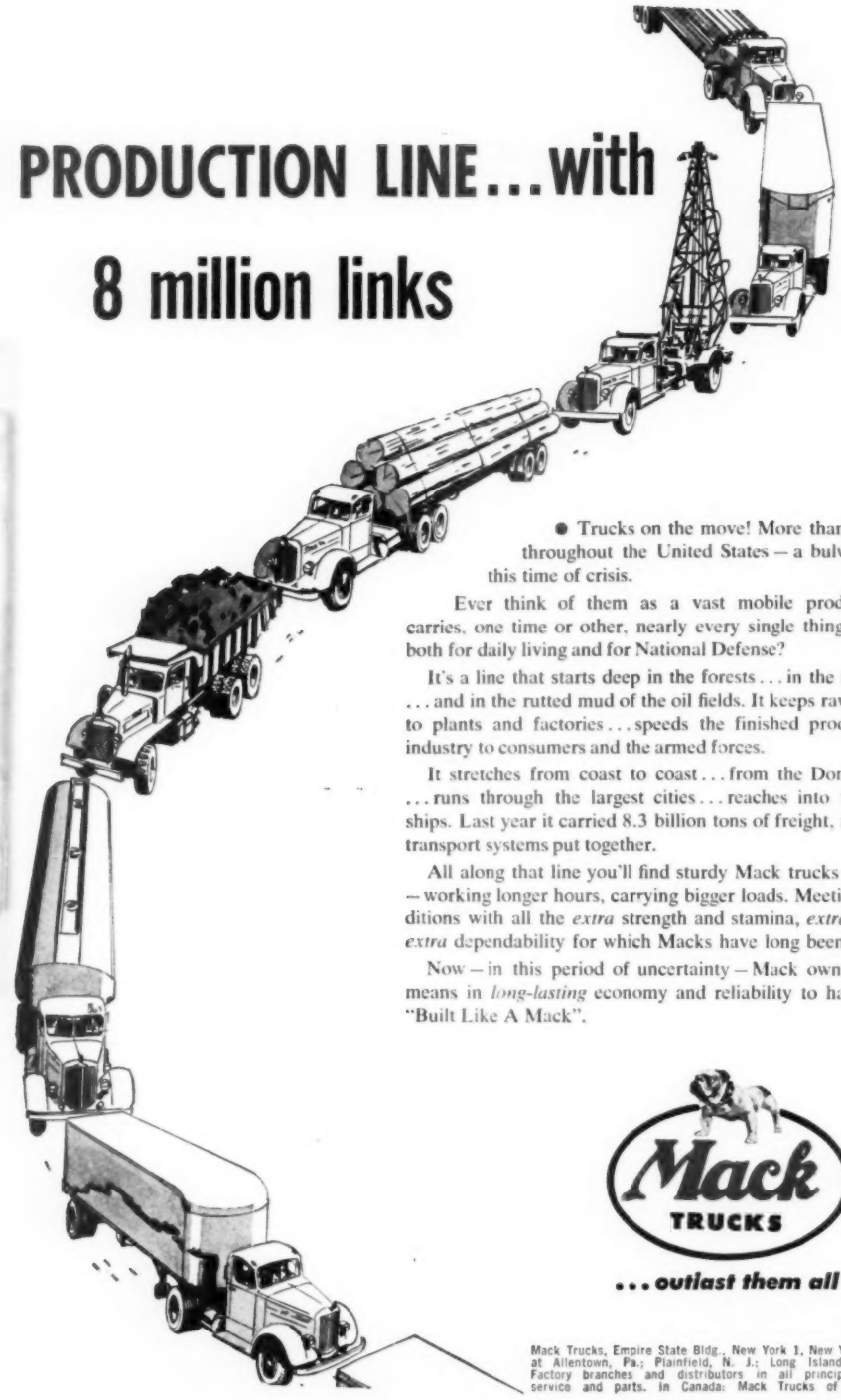
AUGUST
1951



Oswego plant of Oregon Portland Cement Co.

## ANNUAL CEMENT ISSUE

# PRODUCTION LINE...with 8 million links



● Trucks on the move! More than 8 million of them throughout the United States – a bulwark of security in this time of crisis.

Ever think of them as a vast mobile production line which carries, one time or other, nearly every single thing we need and use, both for daily living and for National Defense?

It's a line that starts deep in the forests . . . in the mines and quarries . . . and in the rutted mud of the oil fields. It keeps raw materials flowing to plants and factories . . . speeds the finished products of American industry to consumers and the armed forces.

It stretches from coast to coast . . . from the Dominion to the Gulf . . . runs through the largest cities . . . reaches into the smallest townships. Last year it carried 8.3 billion tons of freight, more than all other transport systems put together.

All along that line you'll find sturdy Mack trucks doing double duty – working longer hours, carrying bigger loads. Meeting emergency conditions with all the *extra* strength and stamina, *extra* performance and *extra* dependability for which Macks have long been famous.

Now – in this period of uncertainty – Mack owners realize what it means in *long-lasting* economy and reliability to have trucks that are "Built Like A Mack".

**Mack TRUCKS**

***. . . outlast them all***

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER


# Where a change to B. F. Goodrich grommet belts saved $100 a week

## *B. F. Goodrich grommet V belts cut costs 20 to 50%*

WHAT would you do if you were spending $100 a week to replace failing V belts on one drive? That was the case in this mill — ordinary V belts failed in a week or less. They couldn't carry the terrific power load.

The company called in the BFG sales engineer and B.F.Goodrich grommet V belts were installed. That was 5 months ago and the grommet belts look as good today as the day they were installed. Here's why:

***Endless*** — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures.

***Concentrated cord strength*** — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

***Better grip, less slip*** — Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

***Only B. F. Goodrich has the grommet!***—No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B.F.Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

*Grommet Belts* BY

**B.F.Goodrich**

**RUBBER FOR INDUSTRY**

AUGUST, 1951

# ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 54, No. 8



## This Month





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To Subscribers—Date on wrapper indicates issue with which your subscription expires. . . In writing to have address changed, give old as well as new address.

B-1047

TL-1530 Trailer with EUCLID

TRB-15D Trailer with GMC

TP-1114 Trailer with FORD

BD-1118H Body with AUTOCAR

# ALL THREE new cement plants chose EASTON SIDE-DUMPS

BP-1114 Body with STERLING

Illustration below shows a double-bottomed EASTON TD-1222H Drop Door Side-Dump Trailer with MACK LR, capacity 45 tons. Investigate these, and other EASTON Side-Dump Trailers and Truck Bodies.

All three of the new cement plants which will operate quarries in the United States (classified as under construction or definitely planned for 1951)*, have chosen EASTON Side-Dumps for quarry haulage.

- **Two of the new plants will use EASTON Model TP-1114 pan type side-dump trailers with Mack LFT's.**
- **One of the new plants will use EASTON Model TL-1015 lift door side-dump trailers with Caterpillar DW-10's.**

EASTON engineers will welcome an opportunity to present, without obligation to you, a thorough survey of your haulage requirements. Start planning now for more efficient quarry transportation by requesting your free copy of EASTON DATAFORM.

**Easton Car & Construction Company • Easton, Pa.**

*From a PIT AND QUARRY survey published May 1, 1951

# Only the Timken Company offers all 3 rock bit types


# and a complete Rock Bit Engineering Service!

WHAT do you want most from your rock bits—lowest bit cost per foot of hole, greatest possible drilling speed, or other advantages? Whatever it is, you can get it from the Timken Company, the only manufacturer who can offer you all three types of rock bits:

**1. MULTI-USE**—gives lowest cost per foot of hole when full increment of drill steel can be drilled and when control and reconditioning of bits are correct.

**2. CARBIDE INSERT**—extremely hard and abrasive ground. Drillers spend less time changing bits.

**3. ONE-USE "SPIRALOCK"**—for use where reconditioning is impractical or undesirable. Lowest unit cost. Has revolutionary new "Spiralock" union.

Because the Timken Company makes all three types, it is possible for our Rock Bit Engineering Service to make unbiased recommendations to meet your drilling needs. Backed by more than 17 years of experience, it is the world's largest rock bit field organization.

**FREE BOOKLET!** Shows and describes full line of bits. A helpful guide to rock bit purchasing. Write on your company letterhead to The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".


**TIMKEN**

TRADE MARK REG. U. S. PAT. OFF.

***your best bet for the best bit ... for every job***

# ZONOLITE—
## JUST ANOTHER "DIGGING JOB" to a NORTHWEST

ZONOLITE, that queer material that keeps the furnace heat in, in winter, and the sun's heat out in summer, is tough, abrasive digging—but, it's just DIGGING to a Northwest Rock Shovel.

This is one of several Northwests the Zonolite Corporation has put in service—repeat orders that prove Northwest ability in mine service where sustained output is paramount. The Northwest is a hard rock shovel. It is built for the hard jobs and if you have a real Rock Shovel *any* digging is easy.

The Northwest Dual Independent Crowd, Northwest Welded Boom Design, the Cushion Clutch, Uniform Pressure Swing Clutches, and the "Feather-Touch" Clutch Control, make a combination of advantages that cut digging costs—a combination of advantages no other machine can give you. You should check into these features so you can plan ahead to have Northwest equipment.

**NORTHWEST ENGINEERING COMPANY**
1514 Field Bldg., 135 South LaSalle Street
Chicago 3, Illinois


# NORTHWEST

*Convertible for any Mining Material Handling or Excavation Problem*

# Shop
# Look
# Listen

**. . . . a good policy to follow when you're buying Cement Plant Machinery**

**SHOP** carefully when you're in the market for new Cement Making Machinery. Make a close comparison of the *smallest details* of construction of the various makes of equipment. Traylor Machinery has a great record for dependability and economy of operation . . . the direct result of the close attention paid to the design and manufacture of every part.

**LOOK** at cement plant installations that have been in service long enough to prove their dependability. For almost half a century, Traylor Cement Plant Machinery has been in operation throughout the world. Today, Traylor is a byword for operating efficiency and high product quality wherever cement is produced.

**LISTEN** carefully to the men who know Traylor best . . . the men who operate Traylor Cement Plant Machinery. You, too, will buy Traylor Equipment.

*a Traylor leads to greater profits*

Two 54" Traylor Gyratories . . . one in Montreal, the other in Great Britain . . . are among the largest of this type of crusher in service in the cement industry. Traylor is now fabricating two more of these large 54" Gyratories for the Canadian Cement Manufacturer. Many other Traylor Gyratories of smaller size are operating in numerous cement plants scattered throughout the world. This type of Traylor Crusher is well known for its extremely low power-per-ton requirements when used in the most rugged primary service.

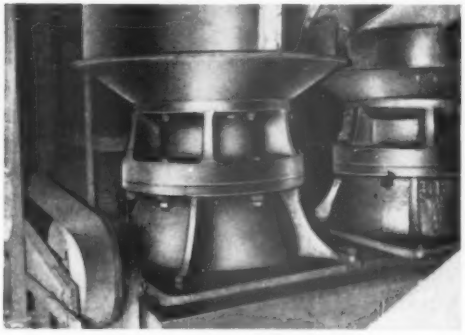
**Traylor**

Rotary Kilns, Coolers and Dryers
Grinding Mills . Crushing Rolls
Jaw, Reduction and Gyratory Crushers
Apron and Grizzley Feeders

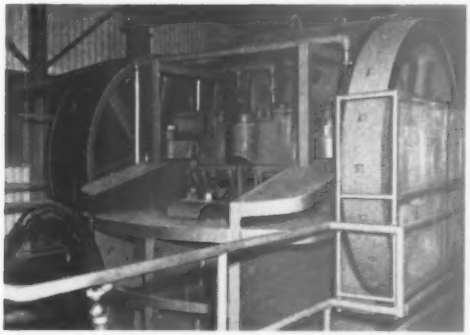
**CEMENT**

**THIS** 10'0" x 400'0" Rotary Kiln, shown operating in a Western cement plant, is one of several Traylor Kilns owned by the same company. One sure indication of the dependability of Traylor equipment, is the number of customers who return to Traylor time after time for all types of Cement Plant Machinery.

**TWO** 8'0" x 40'0" three compartment mills and two 9'6" x 10'2" Ball Mills which are operating in a Rocky Mountain area Cement Plant. These mills are owned by a Traylor customer who operates many other pieces of Traylor Machinery. Traylor builds Ball Mills for both raw and finished grinding. One Traylor customer is operating a total of 27 Traylor Ball Mills in plants in 3 different states.



**TWO** Traylor TY Reduction Crushers employed in a California Cement Plant. The Traylor TY Crusher requires little floor space . . . little head room. Its compact design incorporates maximum strength, great efficiency and easy maintenance. The Traylor TY Reduction Crusher also uses curved crushing surfaces to obtain an extremely favorable output-to-horse-power ratio.



**THIS** 36" x 42" Traylor Jaw Crusher is in primary service in a West Virginia Cement Plant. Traylor builds 5 types of Jaw Crushers in 34 different sizes. All Traylor Jaw Crushers are standard equipped with Traylor's Curved Jaw Plates that reduce choking and packing . . . drastically cut power costs per ton. These curved crushing surfaces account for greater capacities at finer settings . . . will outlast ordinary plates as much as 3 to 1.

**TRAYLOR ENGINEERING & MANUFACTURING CO.**
**377 MILL ST., ALLENTOWN, PA.**
**Sales Offices: New York, N.Y.; Chicago, Ill.; Los Angeles, Calif.**
**Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P.Q.**

# MACHINERY

**SEND FOR** Bulletin 5121 which contains full data on Traylor Machinery for the Cement Industry. Sign your name below for your copy.

Name _____

Company _____

Address _____

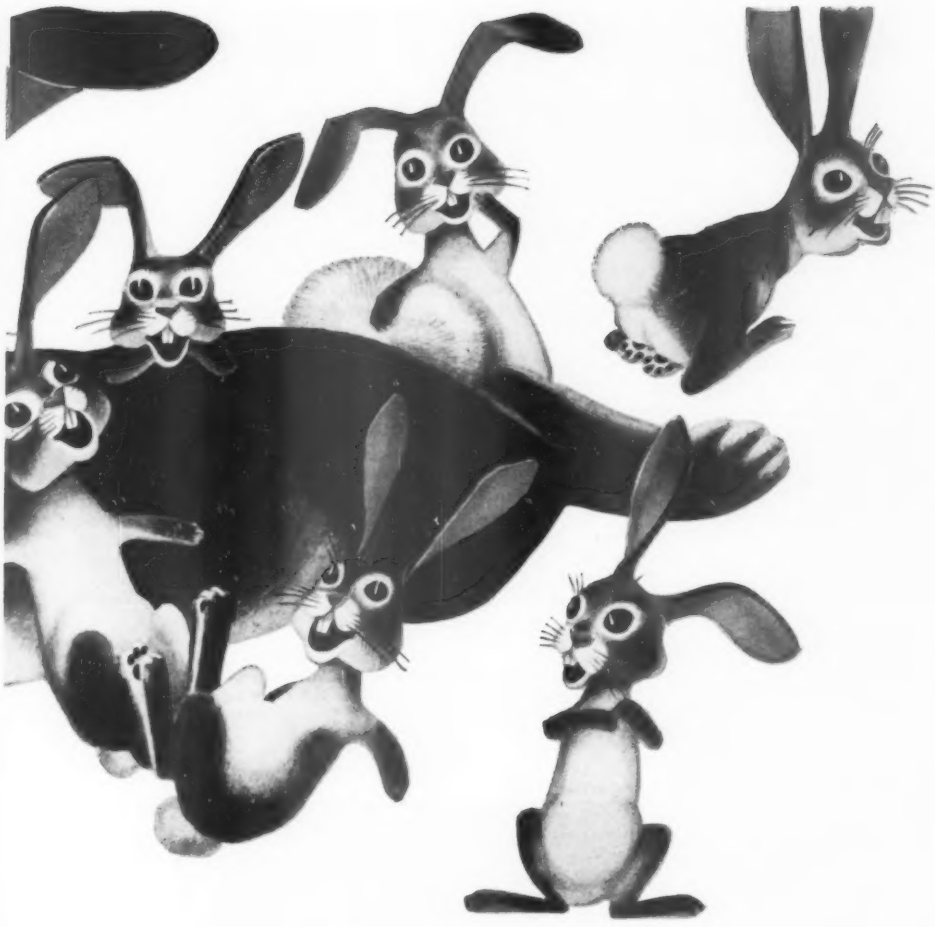
# LITTLE THINGS HAVE A WAY OF ADDING UP!

*Especially today*—there's extra need to guard your expensive equipment against excessive downtime. Sometimes this is caused by seemingly *small* things, but these small things can result in stuck rings, scored cylinders, worn bearings—and really add up to costly trouble! For example...

In an Eastern bus fleet, major overhauls became necessary after 60,000 to 80,000 miles—well below previous mileage. A Socony-Vacuum engineer was called in. He traced the trouble to road dust by-passing the air cleaner and reaching the engine cylinders. His recommendations *doubled* the mileage between overhauls, and saved the cost of an expensive investigation.

In *your* operation, too, there may be conditions which—unknown to you—are affecting the Correct Lubrication of your machines, thus increasing maintenance costs and cutting your profits. *Why not find out?*

Socony-Vacuum, with 85 years of lubrication experience, will develop a program of Correct Lubrication custom-made for *your* equipment and operating conditions. Why not get this program started *today?*



## Here's Practical Help for Contractors . . .

Socony-Vacuum gives you . . .

- Help on maintenance problems.
- Individual, tested lubrication schedules.
- Advice on correct application of lubricants, proper handling and storing.
- One source of supply—available everywhere.
- Simplified inventory—with . . .

1. **DELVAC OILS**—for all gasoline and automotive-Diesel engines.
2. **MOBILUBE GX**—multi-purpose gear lubricant for all enclosed gears—manually operated transmissions, rear axles and final drives.
3. **MOBILGREASE**—in grades and types for proper lubrication of all chassis parts and engine accessories.

SOCONY-VACUUM

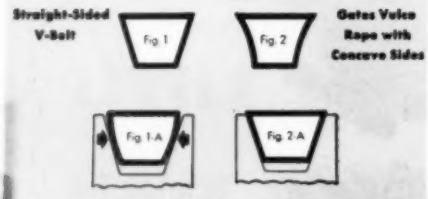
# CORRECT LUBRICATION

*for Contractors*

THE FLYING RED HORSE COMPANIES: SOCONY-VACUUM OIL COMPANY, INC.
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

# Here is *Exactly WHY* a V-Belt with CONCAVE SIDES Gives You *Longer Wear!*

**What Happens When a V-Belt Bends**




How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley — Uniform Wear — Longer Life!


To see for yourself how a V-Belt that has *concave sides* is certain to give longer wear, just make this simple test:—

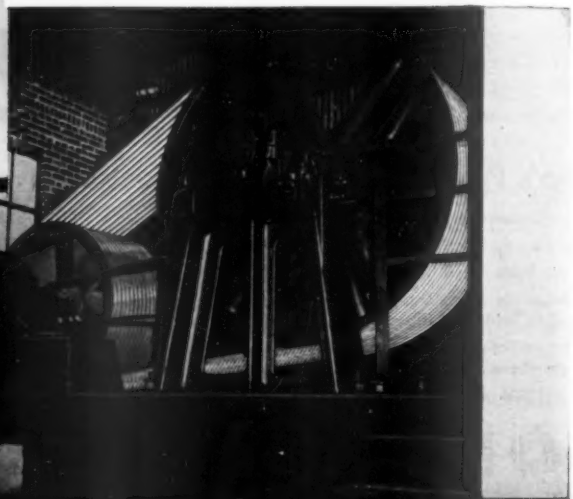
**Pick up any V-Belt you have at hand. Bend that belt as it bends around a pulley. As it bends, grip its sides between your fingers. Here is what will happen *everytime*.**

If the V-Belt you are testing has *straight sides*, you can feel those sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-Pulley and you naturally get *concentrated* wear just where the bulge is greatest—as shown in figure 1-A, at left.

**Now, make this same test with the belt that is built with *Concave Sides*—the Gates Vulco Rope!**

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt costs for you!

**Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!**



Gates Vulco Rope Drive on the Mine fan of Sloss Sheffield Steel & Iron Company, Birmingham, Alabama. The drive operated 24 hours a day for 3 years without down-time.

CS-517

Gates
Hose V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE **DRIVES**
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
*The World's Largest Makers of V-Belts*

## CAN YOU AFFORD A FEEDER WITHOUT THESE 6 FEATURES?

1. **SPROCKET TEETH** . . . replaceable without removing sprockets.
2. **SELF-CLEANING LINKS** . . . they won't jump.
3. **LINKS CAST INTEGRAL WITH PANS** . . . no bolts to lose.
4. **ALL WEARING PARTS** . . . pans, links, sprockets, rollers . . . of cast super-manganese steel.
5. **PANS INTERLOCKED** at four points . . . can't sag.
6. **MOUNTED** on heavy structural steel bed . . . braced and reinforced.

# Lone Star Cement Installs Another Pioneer-Oro Feeder

What better recommendation for a feeder than repeat orders? Last year Lone Star Cement Corporation, one of the world's largest cement producers, installed another PIONEER-ORO Feeder. This huge feeder is 45 feet long with a clear width of 5 feet.

Money can't buy a stronger, tougher feeder! All wearing parts . . . pans, links, sprockets and rollers . . . are of cast manganese steel. The patented pans in this Lone Star installation are ⅞" thick, each weighing 800 pounds. Four supporting points on each pan prevent sagging, even without rollers. PIONEER-ORO Feeders are made in widths up to six feet, and lengths to meet your requirements.

In addition to a broad line of PIONEER-ORO Feeders, Pioneer builds Traveling Grizzly, Forged Steel Apron and Heavy Duty Mechanical Feeders—in many sizes. Mail the coupon below for further feeder information.

*BUY BOTH!*

**Higher Output, Lower Upkeep!**

# Pioneer

*Continuflo* **EQUIPMENT**

## MAIL COUPON TODAY!

**PIONEER ENGINEERING WORKS**
**1515 Central Avenue • Minneapolis 13, Minnesota**

● Please send information on the equipment checked.

- ☐ PIONEER-ORO FEEDERS
- ☐ APRON FEEDERS
- ☐ TRAVELING GRIZZLY FEEDERS
- ☐ CONTINUFLO CONVEYORS
- ☐ JAW CRUSHERS
- ☐ ROLL CRUSHERS
- ☐ VIBRATING SCREENS
- ☐ WASHING PLANTS

Name_____

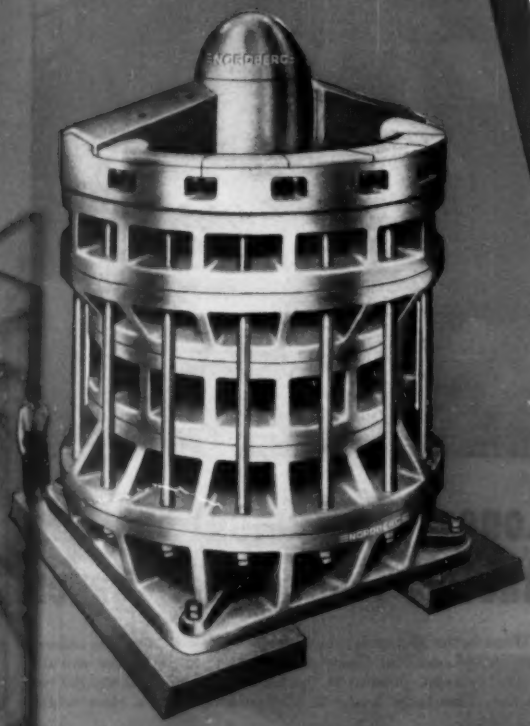
Company_____

Address_____

City_____ Zone____ State_____

*Proven*

# NORDBERG *for* CEMENT

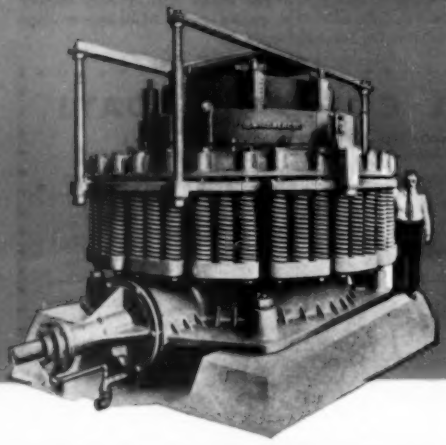


HERE is dependable NORDBERG MACHINERY designed and built especially for the CEMENT INDUSTRY—to assure maximum and continuous production at low operating and maintenance costs. FROM PRIMARY AND REDUCTION CRUSHING AND SCREENING OF RAW MATERIALS, THROUGH THE SUCCESSIVE STAGES OF RAW GRINDING, CALCINING, AND FINISH GRINDING, NORDBERG PROCESSING MACHINERY HAS BEEN PROVEN IN SERVICE BY CEMENT PRODUCERS THROUGHOUT THE WORLD.

NORDBERG CEMENT MACHINERY includes Gyratory Crushers for primary breaking; Symons Standard and Short Head Crushers for preparation of finely and uniformly sized mill feed; Vibrating Grizzlies and Screens for scalping and sizing; wet and dry grinding Ball, Tube, and Compartment mills; Rotary Dryers, Kilns and Coolers.

For dependable low-cost power, a complete line of NORDBERG DIESEL ENGINES is available in sizes ranging from 10 h.p. to 9600 h.p.—a range of sizes to provide the solution to practically any power problem the Cement Industry may have.

## GYRATORY and CONE CRUSHERS for Primary, Secondary and Fine Reduction Crushing



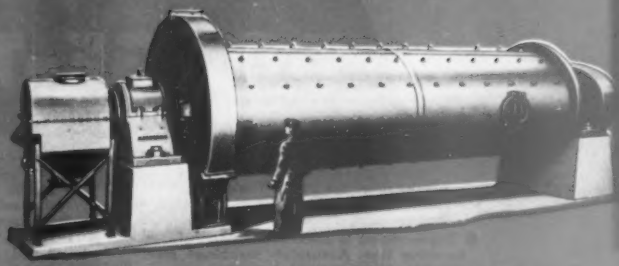
## VIBRATING GRIZZLIES and SCREENS for Scalping and Sizing

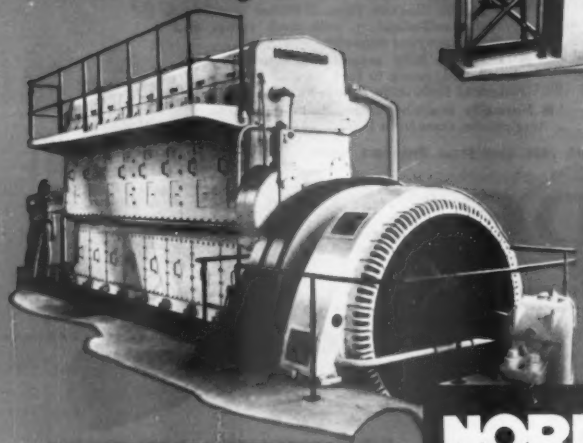
# MACHINERY *the* INDUSTRY

*Dependable*

**DRYERS, KILNS and COOLERS for Pyro Processing Operations, Drying, Calcining, Burning and Cooling**

**GRINDING MILLS for Wet or Dry Raw Grinding and for Preliminary and Finish Grinding**





**DIESEL ENGINES**

**2 and 4-cycle, 10 to 9600 h.p. Burn Gas, Oil or any Combination of Both**

G-151-2

WRITE FOR LITERATURE ON ANY OF THIS MACHINERY

**NORDBERG MFG. CO.**

NORDBERG MACHINERY

MILWAUKEE 7, WISCONSIN

NEW YORK · SAN FRANCISCO · WASHINGTON · SPOKANE
MEXICO D F · LONDON · TORONTO · JOHANNESBURG

**DEPENDABLE**
**under severest conditions of dust and dirt!**

# DODGE-TIMKEN

- Even under layers of grime, dirt and abrasive dust encountered in many production operations, the Dodge-Timken Type C bearing carries its power load smoothly, efficiently, without interruption—because it's
- Triple-sealed to prevent the entry of dust, however fine. Accurately machined steel seals keep dirt *out* and lubricant *in*.
- Dodge mounts, seals, houses Timken precision bearing units in rugged assemblies (four different types) to deliver a minimum of 30,000 hours uninterrupted service.
- Dodge Timken Type C Pillow Blocks are fully self-aligning, with both radial and thrust carrying capacity.
- Delivered fully assembled, adjusted and lubricated, ready to lock on shaft. Locking collars at both ends insure firm fastening.
- Normally available from Dodge Distributors' stocks, sizes from 1-7/16"to 4-15/16".

**DODGE MANUFACTURING CORPORATION, 2600 Union Street, Mishawaka, Indiana**

**DODGE**
*of Mishawaka, Ind.*

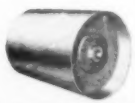
**CALL THE TRANSMISSIONEER,** your local Dodge Distributor for assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

**FIRST IN POWER TRANSMISSION MACHINERY!**

V-BELTS AND TAPER LOCK SHEAVES

TORQUE ARM SPEED REDUCERS

ROLLING GRIP AND DIAMOND D CLUTCHES



SOLID STEEL CONVEYOR PULLEYS

# Mechanical soldiers need good shoes, too!

THESE are days of grave concerns . . . of conservation and mobilization for strengthening the nation's defense—for the survival of our national economy—for the continuance of useful highway, airfield, dam-site and other aggregate-consuming construction programs—for the keeping of every home-front machine in condition to stay on the job until its replacement again becomes a normal procedure.

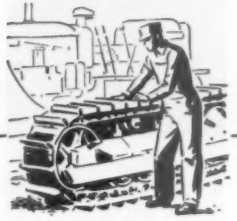
That includes *your* equipment and emphasizes *your* responsibilities. To benefit fully from the productive life that has been built into your "Caterpillar" equipment, you must be alert to its needs as time and hard usage take their toll in wear and depreciation. For instance:

***How are your "Caterpillar" track shoes?***

Tough as they are, they can't battle rocks, shale, jolts and grinds forever. Growing shortages in the premium steels that go into them may make early replacements difficult—and extra care of track parts something to think about.

**CATERPILLAR**, PEORIA, ILLINOIS

**DO THIS NOW**



**YOU'RE THE DOCTOR.** Check those sprockets, grousers, rollers, idlers, pins, links and bushings. Proper track adjustment minimizes wear. Sprockets may need switching from side to side, and pins and bushings need turning, to provide new wearing surfaces. Shoes serve longer if you have worn grousers built up before excessive wear occurs.

*Reread your Operator's Instruction Book.* Anticipate your future parts requirements. Take the facts to your "Caterpillar" dealer. His modern facilities and skilled servicemen are at your disposal. He can rebuild many parts to keep your machines on the job. Their added life will repay the reconditioning cost over and over.

**CATERPILLAR**

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

# KENNEDY STRATIFIED AIR SWEPT

**LOWERS**
- **GRINDING COSTS**
- **POWER CONSUMPTION**
- **MAINTENANCE COSTS**


1 BELT CONVEYOR — FEED TO CRUSHER
2 GEARLESS GYRATORY CRUSHER
3 ELEVATOR
4 VIBRATING SCREEN
5 OVERSIZE RETURN CHUTE
6 TRAVELING CRANE
7 CLAMSHELL BUCKET
8 MILL FEED HOPPER
9 WEIGHING FEEDER
10 STRATIFIED AIR SWEPT TUBE MILL
11 RADIAL FLOW CLASSIFIER
12 CYCLONE COLLECTOR
13 MILL EXHAUSTER
14 DUST FILTER
15 DUST FILTER EXHAUSTER
16 ROTARY AIR LOCKS
17 FINISHED MATERIAL CONVEYOR
18 AUTOMATIC PNEUMATIC TRANSPORT PUMP

***THIS UNIT PRODUCED 94% PLUS THROUGH***

## KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

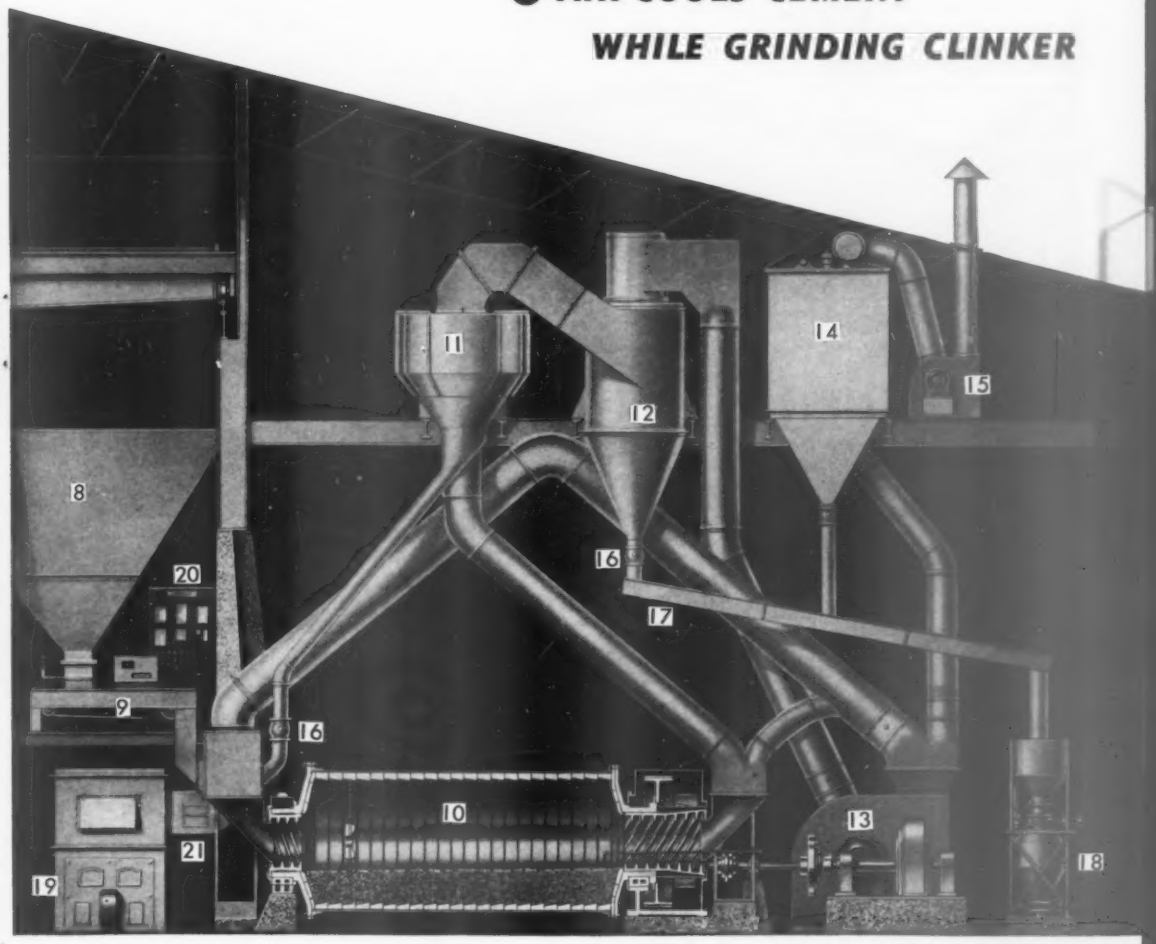
# TUBE MILL SYSTEM

Patents Pending

FOR RAW STONE, ORE AND CLINKER GRINDING

● **DRIES AND GRINDS SIMULTANEOUSLY**

● **AIR-COOLS CEMENT WHILE GRINDING CLINKER**




19 HOT AIR FURNACE
20 INSTRUMENT AND CONTROL CUBICLE
21 AUTOMATICALLY CONTROLLED TEMPERING AIR DAMPER

FINISHED MATERIAL TO STORAGE SILO

● **ASK FOR ONE OF OUR ENGINEERS TO CALL**

**325 MESH WHEN GRINDING CLINKER 2" AND FINER**

2 PARK AVENUE • NEW YORK 16, N. Y. FACTORY: DANVILLE, PA.

**"TOUGH PROBLEMS INVITED** — Ask us or your nearest BWH distributor about your power transmission belting, conveyor belting and hose problems. We're specialists in making mechanical rubber products work *better, longer."*

*This ¶ in our V-Belt ads is no Afterthought*

# It Can Help You to Lower Costs and Increase Efficiency

*Another Quality Product of*

**BOSTON WOVEN HOSE & RUBBER COMPANY**

Distributors in all Principal Cities

PLANT: Cambridge, Mass. • P. O. Box 1071, Boston 3, Mass., U. S. A.

BWH — DEPENDABLE RUGGEDNESS

## *And Don't Forget These 4 Basic Advantages of BULL DOG V-Belts*

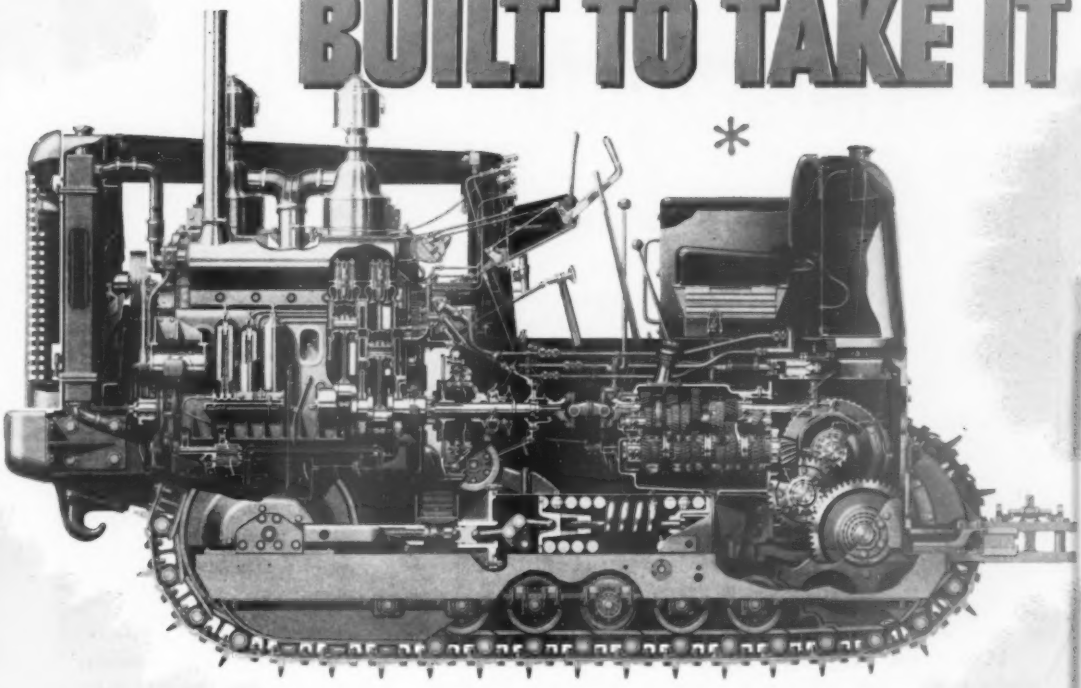
**1.** Durable Covers — closely woven, heavy, bias-cut fabric withstands the severe wearing action where belt meets sheave. *You get* longer wear plus sealing of the belt against entrance of dirt, moisture, grease.

**2.** Minimum Stretch — due to an exclusive technique in processing Bull Dog Cords. *You get* less slippage, fewer adjustments, extra belt life.

**3.** Specially Engineered BWH Cord Section has high tensile strength. *You get* superior load carrying capacity and stamina to absorb shock loads.

**4.** Takes Punishing Flexing — BWH research has paid off in quality-controlled compounds. *You get* compounds which run cooler and don't crack or deteriorate under severe flexing.

# Here's what WE mean by BUILT TO TAKE IT



The new Allis-Chalmers tractors are the toughest, strongest tractors ever built. Every part in each of the four models has ample size and strength to do its job — not a weak link nor a compromise anywhere.

And that's no accident! To bring you tractors like these . . . with the qualities you want . . . Allis-Chalmers built 'em completely new — from the ground up.

You can depend on them to take the loads, the jolts of today's jobs . . . because they are modern tractors designed for the most grueling operating conditions. They will more than measure up to your expectations!

Here are just a few of the many reasons why this NEWEST, FINEST TRACTOR LINE ON EARTH is *Built To Take It*... besides being easy to operate, easy to service and outstanding in performance. Your Allis-Chalmers dealer will gladly explain all these advantages . . . see him NOW.

- All-Steel Welded Construction
- More Power with Bigger Engines — Longer Engine Life
- More Weight, Greater Strength
- Extra Heavy Main Frames — No Extra Reinforcement Needed for Front-Mounted Equipment
- Long-Lasting, Large Diameter Clutches
- Double Reduction, Straddle-Mounted Final Drive Gears with Live Sprocket Shafts and Caged Bearings
- Positive Operating Track Release — Works in Oil on HD-9, HD-15, HD-20
- All New, Specially Designed Track Assembly
- Positive-Seal Truck Wheels, Support Rollers and Idlers — Mounted on Tapered Roller Bearings. 1,000-Hour Lubrication!

# ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

***The Newest, Finest Tractor Line on Earth!***


40.26 drawbar hp.
11,250 lb.


70 drawbar hp.
19,300 lb.


102 drawbar hp.
27,850 lb.


Hydraulic Torque Converter Drive
175 net engine hp.
41,000 lb.

- DESIGNED FOR YOUR JOB
- BUILT TO "TAKE IT"
- EASY TO OPERATE
- EASY TO SERVICE


High tension lines, thunder storms, power cables . . . all can be sources of stray electrical currents under certain conditions.

When blasting you can guard against them by using Primacord as the primary detonating agent because Primacord is not affected by stray currents, nor can it be set off by friction, sparks, or ordinary shock. It must be detonated to produce the powerful explosive wave which travels at approximately 4 miles per second throughout its length.

Use Primacord from top to bottom in each hole, and to connect all holes. You'll get good shots with more work from your explosives, easier digging and better output.

Reinforced Primacord for trunk lines and deep holes where extra tensile strength and resistance to abrasion are desirable; Wire Countered Primacord for deep, ragged holes and high abrasive conditions; Plastic Reinforced Primacord for very deep, wet holes, river crossings, etc.; Plain Primacord for surface trunk lines and shallow holes. P-84

**The Ensign-Bickford Company**
**Simsbury, Connecticut**

# PRIMACORD®-BICKFORD

DETONATING FUSE

*Also Ensign-Bickford Safety Fuse — Since 1836*

# ROLL ON TO PROFIT WITH UNIVERSAL

The most complete line of portable crushing, screening, washing and loading equipment for rock, gravel, aglime and concrete aggregates available. For big jobs, for small jobs, for any aggregate requirement buy Universal. See your Universal distributor or write for illustrated literature.

**UNIVERSAL ENGINEERING CORPORATION**
617 C Avenue N. W., Cedar Rapids, Iowa
Phone 7105

**Division of PETTIBONE MULLIKEN CORPORATION**
4700 West Division St., Chicago 51, Illinois
Phone SPaulding 2-9300


# Here are the BENEFITS of BENEFICIATION by Flotation

## BROADEN YOUR PRODUCTION
## REVIVE YOUR QUARRY

Depending upon the composition of your "run-of-quarry" stone, the Flotation Process may enable you either to modify the analyses of the kiln feeds or to permit the practical substitution of other available components, and thus adjust the chemical ratios of your raw materials to broaden your production to include all five standard Types of cement (I-II-III-IV-V). It provides for the economical use of inferior limestones; materially lengthens the life of the quarry; and reduces costs by avoiding selective quarrying.

When properly integrated with the grinding and classification circuits, the Flotation Process usually involves a saving in power; and burning characteristics of the final compositions are improved. The total savings may more than offset the operating costs of flotation. The rejects of the process may be a saleable by-product.

Normally the Flotation Process can be installed in your plant without affecting existing equipment or interfering with your production schedule.

Each quarry involves special conditions, and special flow sheet requirements. Our laboratory and pilot plant are fully equipped to handle a thorough investigation of your materials. After this investigation, by mining and chemical engineers, trained in cement chemistry, we can design, equip, and supervise the erection of a complete raw-material plant, engineered to meet your individual requirements. Preliminary examinations are made without obligation on your part. Write us for detailed information.

**SEPARATION PROCESS COMPANY**

**CATASAUQUA, PENNSYLVANIA**

Patent rights outside North America controlled, test work undertaken and equipment furnished by F. L. Smidth & Co. A/S Copenhagen.

S-9

**A MESSAGE TO AMERICAN INDUSTRY**

# "This is more than a shortage . . . this is an emergency.

## *Every pound of your scrap is needed, NOW!"*

"THE STEEL INDUSTRY is currently operating at more than 100% of rated capacity—turning out well over 2 million tons of steel per week. This record high production—every ton of which is in urgent demand—cannot be kept up unless we get more scrap from every potential source. For without your scrap we cannot produce enough steel. Today, every ton of steel turned out requires a half a ton of scrap for its production. That's why scrap—more scrap—is so urgently needed, and needed right away.

"The fact we have to face today is that steel mills are operating on a hand-to-mouth basis as far as scrap is concerned. Some mills are working on only a two-day supply of scrap. We already have had to shut down steel-making furnaces for lack of scrap.

"That's why we are asking you to strain every effort to get more scrap out of your plants and yards and on its way to the mills . . . to search out the scrap that doesn't come to market in normal times. You'll find this "dormant" scrap in obsolete equipment, tools and machinery that you haven't used for years . . . overlooked in your storage sheds . . . or rusting away in a junk pile in some forgotten corner. It's there. Turn it in at once—*so we can turn out the steel you need.* We can't do it without your help."

President, United States Steel Corporation

USS

UNITED STATES STEEL


FASTER, LOWER-COST DRILLING!

# JOY *Lightweight* WAGON DRILLS

## *THE EXCLUSIVE "DRILL AND BLOW" FEATURE MEANS YOU BLOW THE HOLE AS YOU DRILL!*

- ★ **LIGHTWEIGHT only 750 lbs.**
- ★ **EASY ONE MAN HANDLING**
- ★ **FINGER-TIP CONTROL**
- ★ **POSITIVE LOCKING BRAKES**

**WRITE FOR BULLETIN, OR**

*Consult a Joy Engineer*

W&D C 2817

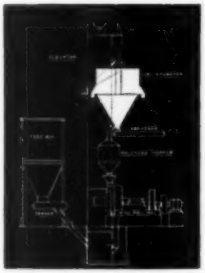
**JOY MANUFACTURING COMPANY**

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

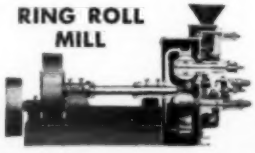
# STURTEVANT AIR SEPARATORS

*Produce Aggregates that meet Government Specifications*



Sturtevant Air Separator in "closed circuit" with pulverizer. This combination increases tonnage and reduces costs in all types of industry.

**RING ROLL MILL**



Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

On dam projects throughout the country, Sturtevant Air Separators are helping contractors meet U. S. Corps of Engineers specifications for proper analysis of aggregates. Here's how — Sturtevant Air Separators de-dust and remove the fine fraction according to the mesh required. Dry or damp sand can be handled in any tonnage desired in ranges from 30 mesh and finer to eliminate screen in the production of intermediate sizes.

The de-dusted sand of proper mesh is then inter-blended with the screened sand or aggregates in the proper proportions providing aggregates that meet specifications.

Sturtevant Air Separators are fast and accurate. They increase production of aggregates, cut production costs.

Investigate Sturtevant Air Separators for your jobs. Write for details, today.

**STURTEVANT MILL COMPANY**

102 CLAYTON STREET, BOSTON 24, MASSACHUSETTS

*Designers and Manufacturers of:* CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS MECHANICAL DRYS and EXCAVATORS • ELEVATORS • MIXERS

Now

*Better Lubrication for kiln bearings*

# Gulf Block Grease

Gulf Block Grease provides a new kind of lubricating performance in cement kiln bearings, and other open top plain bearings in crushers and pulverizers — keeps them operating cooler, and eliminates the need for supplemental oiling.

Gulf Block Grease is manufactured from a high quality lubricating oil and a special soap base under scientifically controlled conditions. The oil provides a protective film as soon as the shaft begins to rotate—and is released at the most economical rates over a wide range of operating conditions. It is effective at temperatures as high as 275° F. yet is not excessively hard at low operating temperatures.

It has excellent oiliness characteristics and does not glaze—which means the bearing always gets the protection of an effective friction-reducing oil film, and doesn't overheat or wipe.

Call in a Gulf Lubrication Engineer and ask him to show you how Gulf Block Grease can help you increase bearing life and reduce maintenance costs. Write, wire, or phone your nearest Gulf office today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

# MODERN CEMENT PLANTS

View of the concrete required for a modern Cement Plant recently completed by Stearns-Roger. A considerable portion of the 200,000 cu. yds. of concrete shown was poured under winter conditions, with temperatures as low as 20 degrees below zero.

Recent contracts undertaken by Stearns-Roger include not only modern cement plants, but also power plants, chemical processing plants and mineral processing plants.

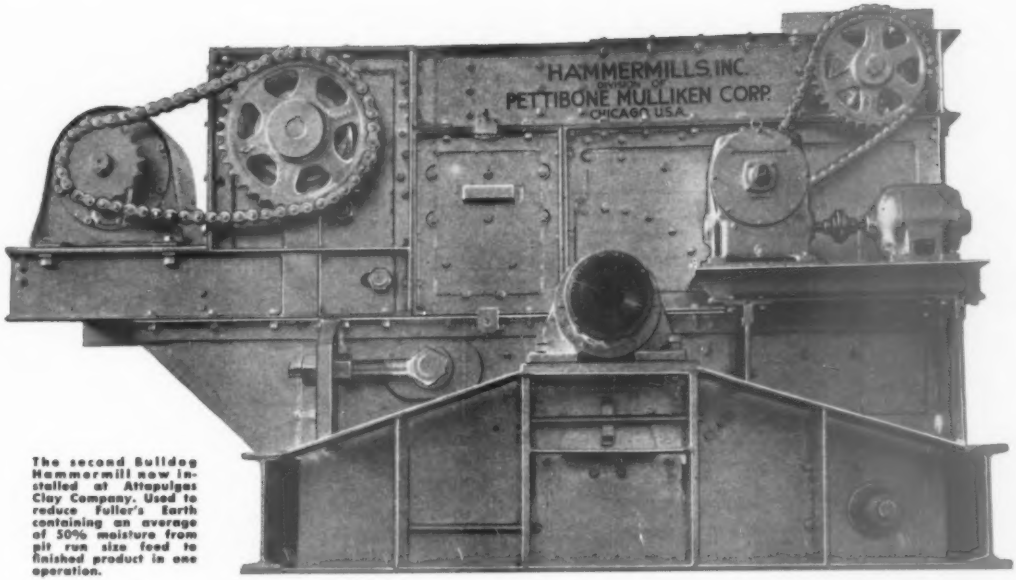
Our engineers start with the preliminary study of the plant location, which leads to the subsequent design and construction of the plant—testing the plant and turning it over to the customer ready to run.

**UNDIVIDED RESPONSIBILITY**
- Engineering
- Designing
- Manufacturing
- Construction

**Stearns-Roger**

THE STEARNS-ROGER MFG. CO. DENVER COLORADO

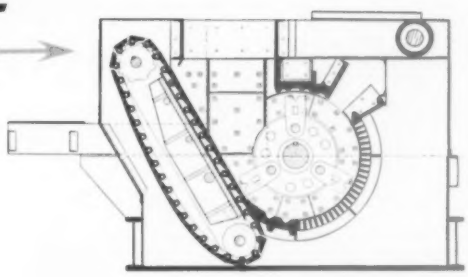
DENVER • HOUSTON • EL PASO • SALT LAKE CITY




The second Bulldog Hammermill now installed at Attapulgus Clay Company. Used to reduce Fuller's Earth containing an average of 50% moisture from pit run size feed to finished product in one operation.

# BULLDOG HAMMERMILL

## with Moving Breaker Plate →



**For wet, sticky material reduction . . . for those tough, heavy-duty crushing jobs.**

Illustrated above is the last word in Moving Breaker Plate Hammermill design. It is built by an engineering organization whose experience far surpasses any organization that might furnish Moving Breaker Plate crushing equipment.

Design Improvements have increased reduction efficiencies and lowered H.P. requirements. You can see this equipment in operation at any time. Also Hammermills will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.

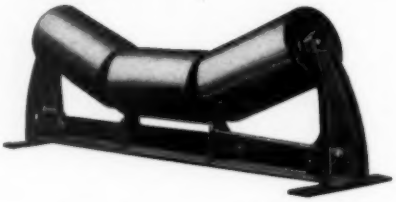
**Bulldog Hammermills are built in capacities up to 1000 tons per hour for every purpose: for primary, secondary, fine reduction of materials such as limestone, shale, Fuller's Earth, phosphate muck, phosphate mud balls, iron ore, oyster and clam shells, any reducible material.**

**HAMMERMILLS, INC.,** division of **PETTIBONE MULLIKEN CORPORATION**

**4766 W. Division St.** **Chicago 51, Illinois** **Phone SPaulding 2-9300**

# 2 ways L-B Belt Conveyors
# cost you less in the long run

## 1 LINK-BELT Idlers require minimum lubrication and adjustment



BY MINIMIZING maintenance . . . holding "down-time" to a new low . . . reducing power requirements — Link-Belt Roller Bearing Idlers save you money.

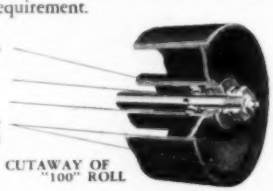
And, because of standardized design, Link-Belt gives you the famous "100" Idler or the heavy-duty "200" Idler at a cost lower than you'd expect. You can choose from the full Link-Belt line of troughing, impact-cushioning, belt training and flat belt idlers in a wide range of roll diameters and belt widths. A complete line to meet any requirement.

Grease-in, dirt-out, cartridge type unit seal preserves lubricant. No springs, no loose parts, no sliding metal-to-metal contact.

Large grease reservoir prolongs lubrication intervals.

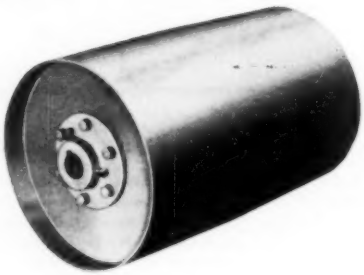
Precision roller bearings maintain alignment.

Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.



CUTAWAY OF "100" ROLL

## 2 LINK-BELT Welded Steel Pulleys minimize shaft deflection



MODERN Link-Belt welded steel design gives you lower maintenance and longer pulley life in more ways than one. Water- and dust-tight construction preserves balance, halts corrosion. Removable hubs — key-seated in line with two set-screws — are interchangeable with many other shaft sizes.

And for reducing shaft deflection (see below), you can't possibly get better protection than with Link-Belt Welded Steel Pulleys.

Since shaft bending moment increases as the square of the distance between shaft bearing and pulley hub, it's easy to see why Link-Belt Welded Steel Pulleys are your best bet. Note how the bearing support and hub of the pulley are mounted with minimum clearance. That's possible because Link-Belt hubs are flush with the pulley face.

## BELT CONVEYORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12.533

LINK-BELT

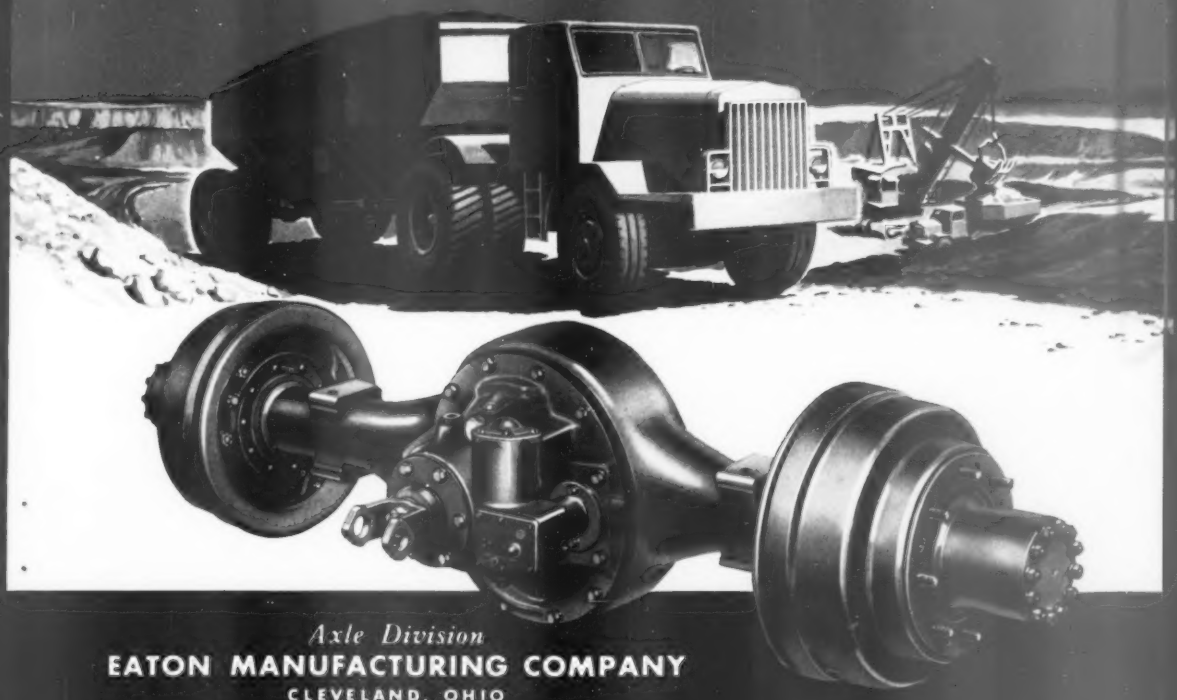
# EATON

## *2-Speed Truck*

# AXLES

## Can Take It!

**Ruggedness of design, plus such exclusive features as planetary gearing and forced-flow lubrication, reduce stress and wear to a minimum, add thousands of miles to axle life. Eaton 2-Speed Axles also add to the life of the vehicle and insure lowest cost per mile, particularly in the kind of service where extra pulling power must be combined with speed. Because Eaton 2-Speed Axles provide the best gear ratio for every operating condition, they permit engines to run at most efficient speeds, and reduce strain on engine and power transmitting parts. Ask your dealer to explain how Eaton 2-Speed Axles will help your trucks do more for less.**



*Axle Division*

**EATON MANUFACTURING COMPANY**

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

# IT COSTS LESS TO OWN THE BEST!

View From Kiln Feed Platform Between The Kilns

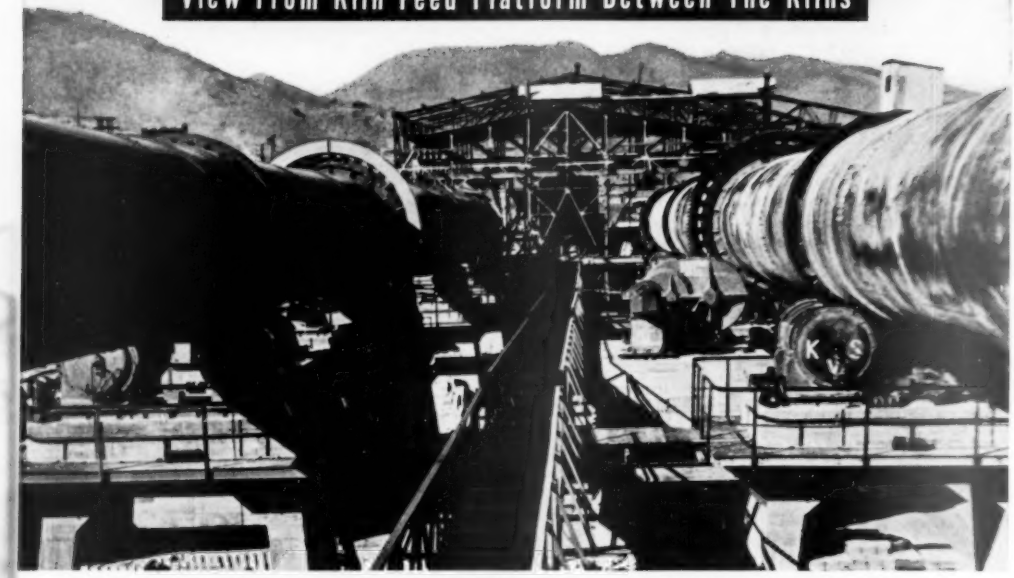



ILLUSTRATION SHOWS TWO LARGE KVS KILNS WITH SELF-ALIGNING BEARINGS

## CAPACITY UNLIMITED!

## KENNEDY KILNS ARE BUILT TO LAST

***featuring:***

ALL-WELDED SHELLS WITH SPECIAL THICK SECTION UNDER TIRES

CARRYING ROLLERS MOUNTED IN OVERSIZE SELF-ALIGNING BEARING TO GIVE LOW SPECIFIC BEARING PRESSURE.

Let a KVS engineer review your plant needs and recommend the proper design and size kiln to meet your needs. Long life and dependable service distinguish all KVS products. It's the users who say "It Costs Less To Own The Best."

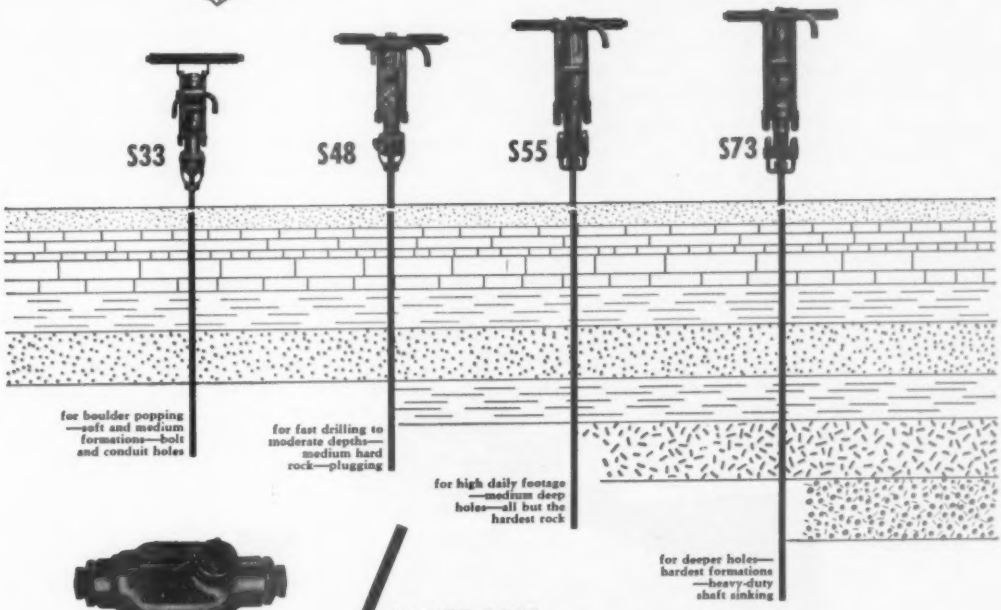
Send for bulletin describing KVS Kilns, Coolers and Dryers

**KENNEDY-VAN SAUN MFG. & ENG. CORPORATION**

2 PARK AVENUE • NEW YORK 16, N. Y. FACTORY: DANVILLE, PA.

# any kind of rock costs less to drill with GARDNER-DENVER sinkers

No matter what kind of rock you find underfoot —there's a Gardner-Denver Sinker of the correct weight and power for lower drilling costs. Every model is designed for fast penetration—powerful rotation—clean blowing—easy holding—low air consumption. Bulletin HHD-11 gives all the facts. Send for your copy today.






***Drills can't run dry*** when the LO12 Automatic Oiler guards your air lines. It stops the flow of air when it runs out of oil.

SINCE 1859

## GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

**THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS**

# "TOURNADOZER says veteran Wyner

### Cleans up at shovel and toe, plus handling odd jobs miles away

Gil Wyner Co., Inc. of Malden, Massachusetts, keeps this big rubber-tired C Tournadozer busy shuttling from one maintenance task to another on their section of State Route 128. This is the new $20,000,000 super-highway which will bypass metropolitan Boston in an 85-mi. semi-circle . . . from Cohasset on the south, around to Waltham on the west and Gloucester on the north.

When these pictures were taken, Wyner's crew was filling a bridge abutment on the western leg, near Lexington. Tournadozer handled shovel and haul-unit clean-up as its main assignment . . . also took care of 3 to 4 odd jobs per day in spare time. In one shift, for example, the "C" was needed in a hurry to help a fleet of graders working 2 miles away. No time or man-hours were wasted waiting for a trailer. Tournadozer operator hopped on . . . drove over main highways at speeds up to 19 m.p.h. . . . was hard at work only a few minutes later. Later in the day, the mobile, rubber-tired "C" cleared and leveled a large field to make a parking lot . . . and, near the end of its 10-hour day, went back again to fine-grade this parking area.

On clean-up work, the high-speed "C" quickly leveled the pit and piled the toe material back into the bank so the shovel operator could keep steadily piling big heaping dippers into the steady parade of empty trucks. Giant, 21.00 x 25 low-pressure tires and powerful 4-wheel drive provided ample flotation and traction in the sandy gravel. With dozer on rubber, there were no parts to grind and wear in this abrasive material. Faster back-up speeds and constant-mesh "instant-shift" transmission saved time every dozing cycle . . . and 19 m.p.h. road speeds permitted profitable use of every working hour throughout the day.

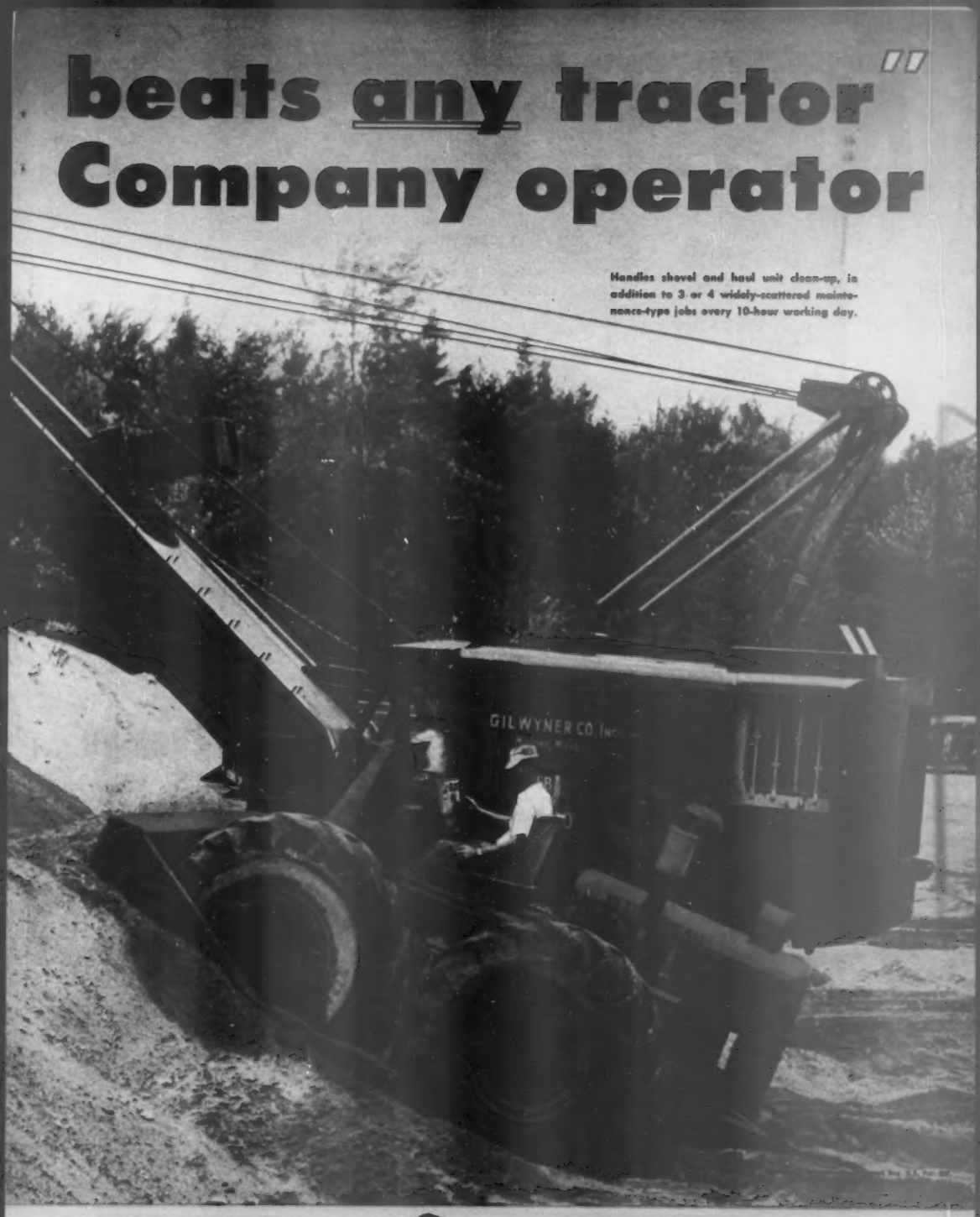
### "Sold" on the Tournadozer

*"I think the Tournadozer is a terrific machine,"* is the way operator Don Van Eeghen sums up its advantages. *"You just have to understand you're on tires—not treads or tracks, and then you can beat any other tractor on a job."*

Let your LeTourneau Distributor show *you* how Tournadozer's high speeds can account for extra yards per hour on *your* work . . . how it can handle extra jobs per day . . . saving you money on every job. Call him, or write for all the facts. Do it TODAY.


TOURNAPULLS · TOURNAROCKERS · · TOURNAHOPPERS · ·

# beats any tractor" Company operator




Handles shovel and haul unit clean-up, in addition to 3 or 4 widely-scattered maintenance-type jobs every 10-hour working day.

LETOURNEAU HIGH-SPEED RUBBER-TIRED TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

# Norblo

## Dust Control Steps Up Cement Production

In modern cement production Norblo dust collection and cement air cooling are fully integrated into the production process. Norblo Automatic Bag Type Dust Collectors are installed in raw and finish millrooms, on stone dryers, combination grinding and drying units, primary and secondary crushing, and in packhouses and with bulk handling into and out of silos. Norblo Automatic Bag Type equipment operates continuously, 24 hours a day and maintains constant pressure drop.

Norblo cement air cooling is an expansion of the normal mill room dust collecting system to control the temperature of the finished cement as it passes through the separator and into storage and to control the temperature of the grinding mill by lowering the temperature of tailings being recirculated. Write for Bulletin No. 165-1 fully describing Norblo Cement Air Cooling.

Cutaway shows Norblo basic unit of 78 bags. Automatic shaking and bag cleaning, one unit at a time, insures full use of cloth area better than 99% of the time.

Write for Bulletin 164-2

## THE NORTHERN BLOWER COMPANY

***Engineered Dust Collection Systems for All Industries***

**6408 BARBERTON AVE. • CLEVELAND 2, OHIO**

# GM DIESEL powers world's most compact 600 cfm Compressor

**CONSTRUCTION**—"Starts like a charm, even on the coldest morning. No time wasted in getting up to pressure. Runs a heavy pile driver with ease. We can set it out of the way with a crane and move it back to the roadway for towing in no time."

**QUARRYING AND MINING**—"We couldn't imagine 600 feet coming from such a slick little compressor until we saw the increased drill footage, and the ease with which it took over two FM-2 wagon drills. Good fuel economy, too."

**HIGHWAY BUILDING**—"Plenty of reserve—full capacity at 6,730 feet altitude. We're operating eight 55-lb. blower drills putting in 20-ft. holes on cliffsides. So easy to maneuver and work with that it's a natural for tough jobs like this."

WINNING acclaim as the world's smallest, lightest, big-capacity portable compressor, the new Ingersoll-Rand Gyro-Flow 600 is powered by a 6-cylinder General Motors Series 71 Diesel engine.

This compact, high-powered portable delivers a full 600 cubic feet of air per minute at a steady 100-lb. pressure, yet it weighs only 9,500 pounds. It is 20 to 40% lighter—and as much as 20% smaller—than other portables of comparable capacity.

Being 2-cycle, GM Diesel engines pack more power in less space. They start quickly on their own fuel, run smoothly and enable equipment to maintain rated performance at high altitudes. They're designed for ease of maintenance—no high-pressure fuel tubing—unit injectors that can be changed in a matter of minutes. And, when needed, low-cost "Factory-Engineered" parts are readily obtainable.

These modern 2-cycle Diesels are bringing new economy and efficiency to more than 500 different kinds of power equipment built by 120 manufacturers. Ask your GM Diesel distributor or write us for full details.

ANSWER THE CALL CIVIL DEFENSE

**DETROIT DIESEL ENGINE DIVISION**

SINGLE ENGINES...Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS...Up to 800 H.P.

GENERAL MOTORS

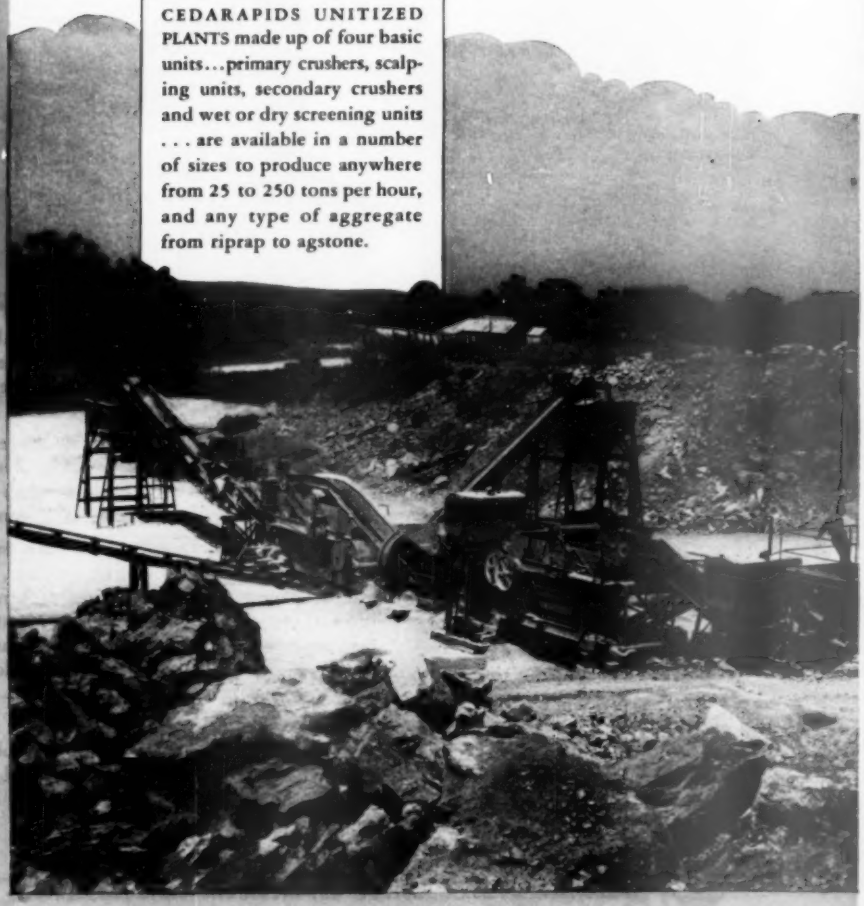
GM GENERAL MOTORS DIESEL POWER

**DIESEL BRAWN WITHOUT THE BULK**

# OPPORTUNITY

## for every aggregate

CEDARAPIDS UNITIZED PLANTS made up of four basic units...primary crushers, scalping units, secondary crushers and wet or dry screening units . . . are available in a number of sizes to produce anywhere from 25 to 250 tons per hour, and any type of aggregate from riprap to agstone.



**THE IOWA LINE** *of Material Handling Equipment Includes:* ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • VIBRATOR AND REVOLVING SCREENS • UNITIZED ROCK AND GRAVEL PLANTS • FEEDERS • PORTABLE POWER CONVEYORS • PORTABLE AND STATIONARY STONE, GRAVEL AND SAND PLANTS • REDUCTION CRUSHERS • BATCH TYPE AND VOLUMETRIC TYPE ASPHALT PLANTS • DRIERS • DUST COLLECTORS HAMMERMILLS • WASHING PLANTS • VIBRATING SOIL COMPACTION UNITS • DOUBLE IMPELLER IMPACT BREAKERS

# UNLIMITED

## or black top producer

CONSTRUCTION of roads, airports, dams and other big projects presents widely different problems, but they all have one thing in common . . . the need for aggregate produced at low cost.

*That's where your opportunity lies!*

You, as an aggregate or black top producer, have the best talking point in the world to make sure of your share of the big contracts . . . it's the ability of your Cedarapids equipment to produce *more* tons of material *at lower cost per ton!* When you talk road building, or construction of any kind, Cedarapids high-capacity production, low-cost operation and steady dependability let you present practical, down-to-earth plans with the emphasis on economy. It means OPPORTUNITY UNLIMITED for you . . . profitable, on-schedule production at a savings appreciated by the taxpaying public.

If you are not already a Cedarapids owner, be sure to see your Cedarapids distributor for the entire story about the equipment that opens the door to your profit opportunity.

Cedarapids

Built by IOWA

**Headquarters for QUALITY EQUIPMENT**

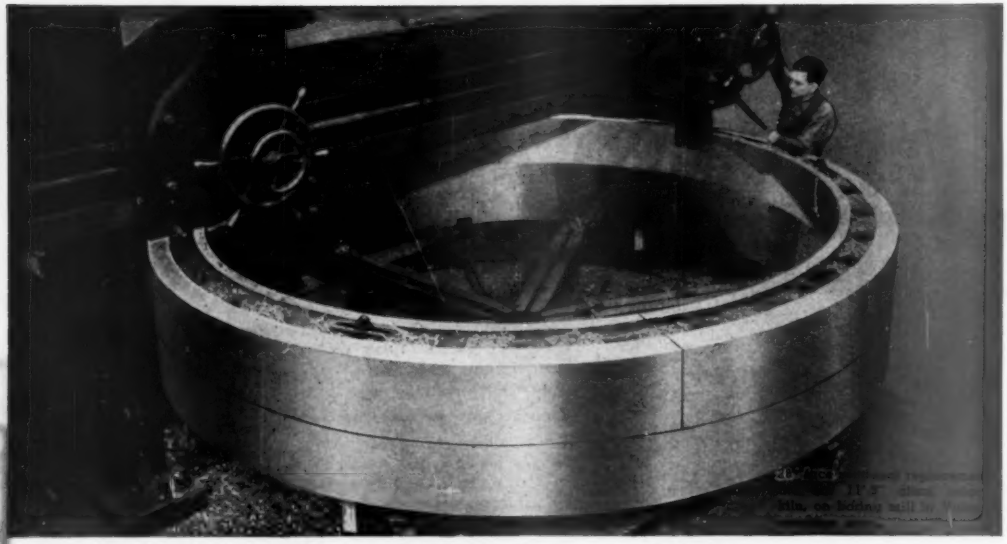
CEDARAPIDS DOUBLE IMPELLER IMPACT BREAKERS are available for *immediate delivery* to give you big volume production of the cubical-shaped material required in so many specifications today. High capacity and high ratio of reduction mean lower plant investment through elimination of much accessory equipment such as secondary crushers, conveyors, etc. Because so much of the material is broken in suspension, power and maintenance costs are low. Four sizes meet every requirement.

●

For the New Jersey Turnpike black top job, the Model 5050 Double Impeller Impact Breaker illustrated at the left is producing 400 tons per hour and more, depending upon the feed. Also shown are a Cedarapids 4' x 14' Triple Deck Horizontal Vibrating Screen and two 8' x 18' Storage Bins, making a complete set-up for big volume production.

## IOWA MANUFACTURING COMPANY

### Cedar Rapids, Iowa, U.S.A.



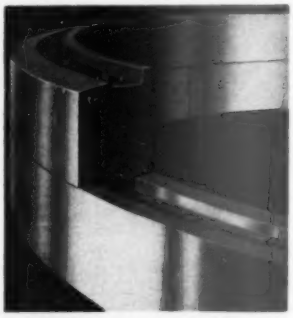
# Here's One Good Reason—why
# VULCAN CAST-STEEL SECTIONAL TIRES
## Always Give Dependable Service

The fact that every Vulcan Sectional Tire is completely assembled before final accurate machining is only one of many reasons why they always give good service when used to replace solid tires on a rotary kiln or dryer. Another reason is that they are always cast in circular form—the upper and lower halves being cast separately and then cut into semi-circles to make the four component parts.

Additional reasons include slow annealing at moderate temperature, to eliminate internal strains while still retaining the necessary strength and hardness to stand up under long-continued severe service.

Naturally the first cost of a Vulcan sectional tire is more than that of an equivalent solid tire, but on most replacement jobs the saving in installation costs—plus the saving in shut-down losses—is so great that no responsible executive can afford to overlook their ultimate economies.

If you operate rotary kilns, coolers, dryers or retorts, you may easily achieve important savings by ordering Vulcan Sectional Tires NOW and having them ready to slip on before trouble actually develops.



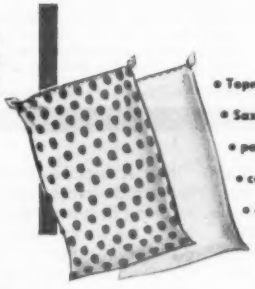
Close-up of tongue-and-groove joint on Vulcan sectional tire shown above. Bolt holes through the tire sections are reamed for 2" fitted bolts, with hex and jam nuts.

## VULCAN IRON WORKS, Wilkes-Barre, Pa.

Rotary Kilns, Coolers and Dryers
Rotary Retorts, Calciners, Etc.
Improved Vertical Lime Kilns
Automatic Quick-Lime Hydrators
Toothed, Double-Roll Crushers
High-Speed Hammer-Type Pulverizers
Ball, Rod and Tube Mills
Shaking-Chute and Chain Conveyors
Heavy-Duty Electric Hoists
Self-Contained Electric Hoists
Scraper-Loading Hoists
Cast-Steel Sheaves and Gears
Steam Locomotives
Diesel and Gasoline Locomotives
Diesel-Electric Locomotives
Electric Locomotives and Larrys

# Amateur standing...
## *in need of an expert!*

BAGS FOR ALL INDUSTRY AND AGRICULTURE



- Topmill burlap bags
- Saxolin open mesh bags
- paper and Multiwall bags
- cotton bags of all kinds
- combination bags, liners and specialties

Your bag requirements also will best be served —if you'll call in an expert. Your container should be designed to protect YOUR product . . . to best reflect the quality of YOUR product. Your Chase Salesman is technically trained. He knows his business . . . and how to apply it in the best interests of *your* business. Call him in. He is supported by more than 100 years of experience in providing better bags for American industry and agriculture.

CHASE BAGS SINCE 1847

*for Better Bags...Better Buy Chase*

**CHASE BAG CO.** GENERAL SALES OFFICES: 309 W. JACKSON BLVD., CHICAGO 6, ILL.

BOISE • DALLAS • TOLEDO • DENVER • DETROIT • MEMPHIS • BUFFALO • ST. LOUIS • NEW YORK • CLEVELAND • MILWAUKEE
PITTSBURGH • KANSAS CITY • LOS ANGELES • MINNEAPOLIS • GOSHEN, IND. • PHILADELPHIA • NEW ORLEANS • ORLANDO, FLA. • SALT LAKE CITY
OKLAHOMA CITY • PORTLAND, ORE. • REIDSVILLE, N. C. • HARLINGEN, TEXAS • CHAGRIN FALLS, O. • WORCESTER, MASS. • CROSSETT, ARK. • SAN FRANCISCO

# GET HIGH CAPACITY, ACCURATE SIZING

# For Fine Materials


## Here's How it Works




- The first section of the screen deck is sloped steeply for quick stratification, rapid conveying.
- The center section is set at less slope to slow down conveying rate.
- The discharge end section is set at a flatter angle than the second section to further reduce the rate of material travel.

The "Tri-Slope" deck can be used for screening material in ½x0, ⅜x0 and ¼x0 sizes. *Ripl-Flo* screens with "Tri-Slope" deck are available in 3x9, 4x9, 5x9 and 6x9 ft sizes. Single deck or single deck with conventional top deck. Send for **Bulletin 25B6280B.**

*Ripl-Flo* and Texrope are Allis-Chalmers trademarks.

Now—Allis-Chalmers offers you a vibrating screen with a new deck designed to control rate of material travel for more efficient screening of fine materials.

*Ripl-Flo* screens with new "Tri-Slope" deck feature a deck divided into three sections, each at a decreasing slope to provide a high rate of travel at feed end to reduce bed thickness and obtain rapid stratification . . . a retarded conveying rate on the second section . . . a further reduced rate at the discharge end as the bed becomes thinner, to pass marginal pieces through the screen.

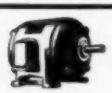
"Sta-Kleen" deck construction makes it possible to screen with higher surface moisture than was previously considered practical . . . and get increased screening capacity.

Special shaped rubber balls bounce between the screen surface and a ball retaining deck located several inches below the screen cloth. These balls dislodge fine particles clinging to the screen cloth. For more facts, contact your A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wis.

**ALLIS-CHALMERS**

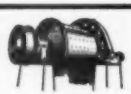
A-3256

**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**


Motors

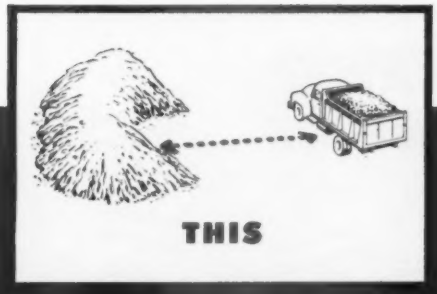

Control


Texrope Drives


Grinding Mills


Crushers


Kilns, Coolers, Dryers



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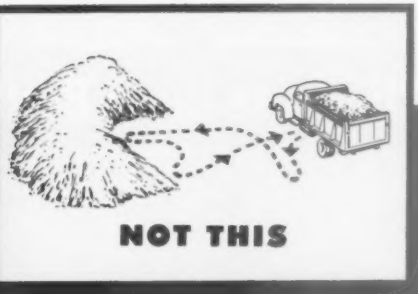


NOT THIS

# ...is the PROFIT WAY!

***You cut out costly loading "detours"...*** save time and effort . . . with an Oliver Industrial Wheel Tractor and Strait-Line Loader. This revolutionary hydraulic, double end tractor-loader can load either in front or rear . . . dump in front. The operator can load and dump without twisting or turning the tractor . . . travel a *straight line* between pile and truck.

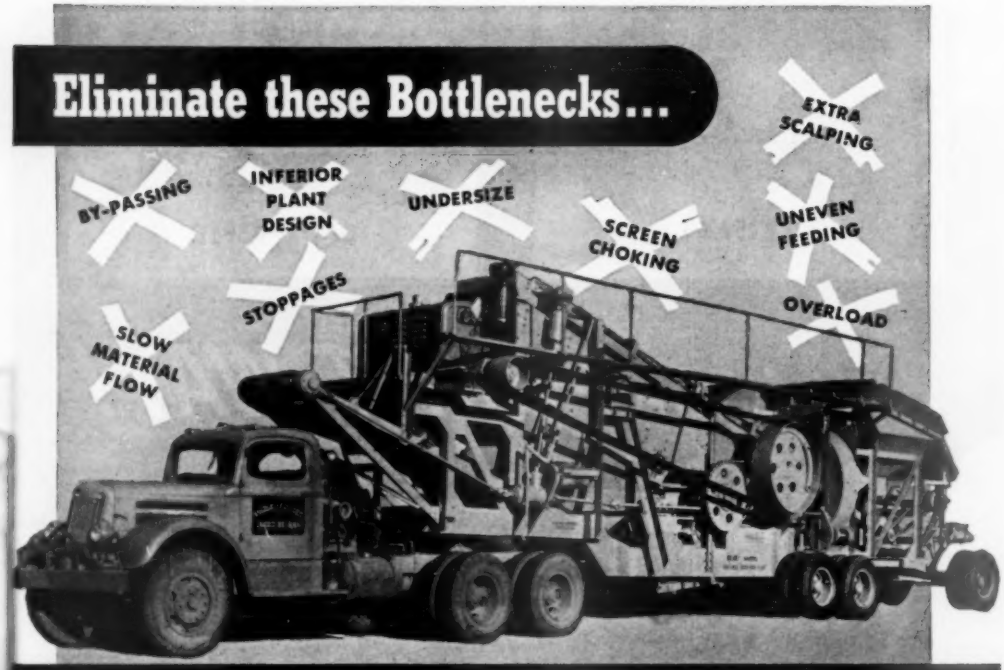
Rear-end digging gives you far more loads with far less effort. "Push-Tilt" bucket with penetrating lips gives you a bigger load every time. With bucket carried in the rear, *and low,* additional traction is created, assuring far greater mobility and maneuverability in any kind of going. Rear-carried bucket puts increased load on rear wheels for increased traction . . . lightens load on front wheels for far easier steering.

Investigate the Oliver—Strait-Line for your operations. Your Oliver Industrial Distributor will give you the complete details. Or, write The Oliver Corporation, Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio.

**THE OLIVER CORPORATION**

*A complete line of industrial wheel and crawler tractors*

# Eliminate these Bottlenecks...




# ...cash in with a DIAMOND PLANT

DIAMOND

## Straight Line Principle

Of Material Flow Is The Shortest Distance Between Peak Production And "Plus" Profits —Assures . . .

- Greater Capacity
- Constant Material Flow
- More Uniform Crushing
- Less Down Time
- Lower Ton Cost
- Higher Production

*Write today* . . . for full information on Diamond Plants—built to keep you in business at a profit. Ask for Rotor-Lift Plant Bulletin D-51-G —Quarry Plant Bulletin D-51-A. Write C/O Dept. F

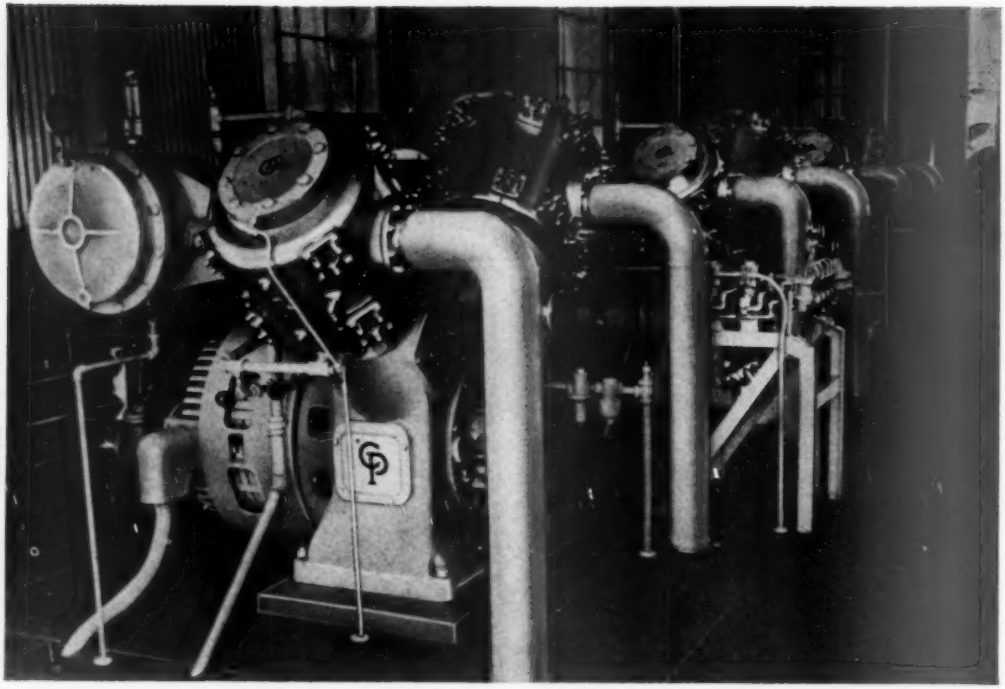
**DIAMOND'S LINE-FLO PRINCIPLE** of aggregate production—characteristic of all Diamond Plants—gives a continuous capacity operation of uniform product at lower ton cost. Five size Portable Rotor-Lift Plants, with capacities ranging from 30 to over 200 cubic yards per hour, will handle your every material processing need. You can bank on a Diamond Plant—regardless of the job—for more raw material input . . . more finished product output. . . more profit margin.

**DIAMOND *Portable* PRIMARY CRUSHING PLANTS** are called on for really rough primary rock busting . . . feed to the Rotor-Lift Plants. Five size Primary Plants available with 15" x 24", 15" x 36", 20" x 36", 24" x 36" and 30" x 42" Jaw Crushers. Diamond's #30 Primary Plant is one of the few produced with a 30" x 42" Jaw Crusher.

*Everything* . . . for the aggregate producer


DIAMOND

**DIAMOND IRON WORKS, INC.**
AND THE MAHR MANUFACTURING CO. DIV.
1756 N. 2ND STREET, MINNEAPOLIS 11, MINNESOTA



# FOR HEAVY DUTY

## COMPACT, EASILY INSTALLED TYPE Y COMPRESSOR

Where floor space is limited, and continuous, heavy duty service is required, the Type Y Compressor is ideal. Available with direct-connected, flange-mounted synchronous or squirrel cage motor.

The Type Y Compressor is easy and inexpensive to install, requiring only a simple foundation. No aligning or leveling is necessary.

CP features that assure high efficiency and low maintenance include large area Simplate valves, multi-step capacity regulation, effective inter-cooling, precision bearings and force-feed lubrication.

Built in sizes from 75 h.p. to 250 h.p., 501 c.f.m. to 1663 c.f.m.; available also with belted and coupled motors.

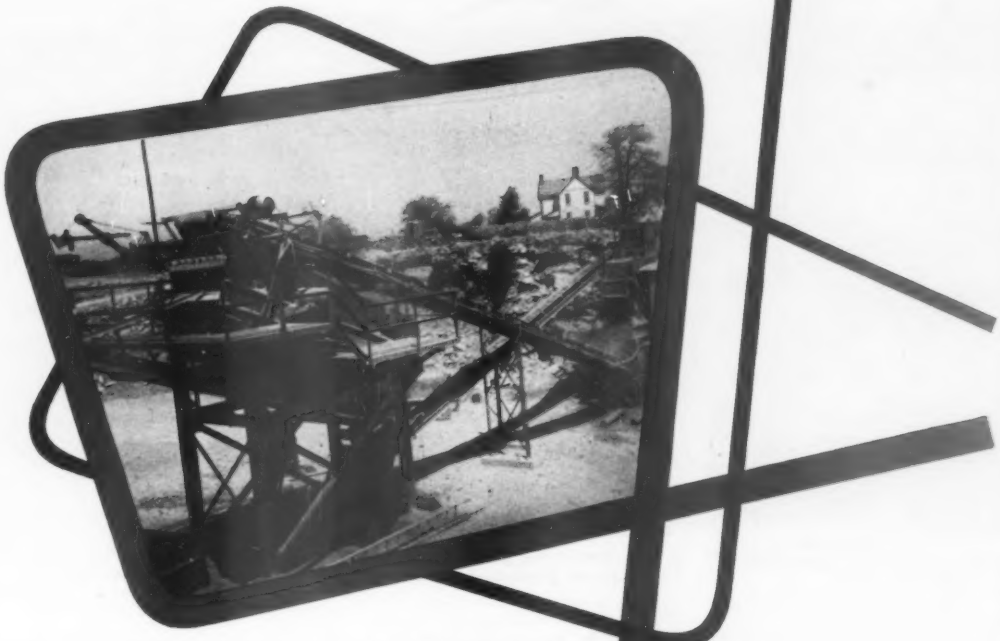
*Write for Bulletin 766*

CHICAGO PNEUMATIC TOOL COMPANY

General Offices 8 East 44th Street New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# SIMPLICITY 5'x12' TWO-DECK SCREEN KEEPS AGGREGATE PRODUCTION HUMMING AT AN OHIO QUARRY



At this Ohio quarry, one Simplicity double deck screen is sizing ballast and filler stone at feed rate of 240 tons an hour. It screens out sizes up to 2" on the top deck, sizes up to 1" on the lower deck and returns larger pieces to the crusher for further processing. Like owners and operators everywhere, the operators at this Ohio quarry have discovered that Simplicity Screens speed up production and keep maintenance costs down. Simplicity gives more screening area. This 5' x 12' screen gives a full 60 sq. ft. of screening surface. Simplicity's famous gyrating action assures fast, accurate sizing. And Simplicity's simplified power and operating mechanism keeps maintenance costs down, makes servicing easier.

***Simplicity Screens can help cut costs and speed up production in your aggregate operations. Write us for full information or consult a Simplicity sales engineer. There's one near you.***

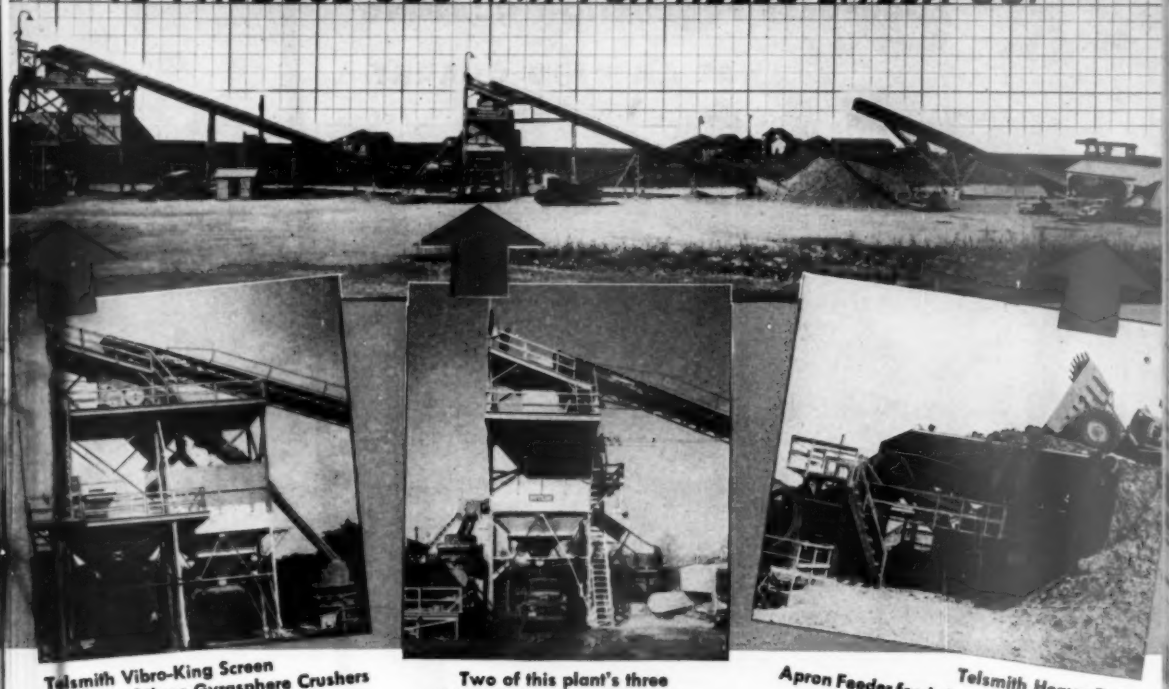
102

- **Sales representatives in all parts of the U. S. A.**
- **FOR CANADA:** Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario
- **FOR EXPORT:** Brown and Sites, 50 Church Street, New York 7, N. Y.

**Simplicity**
TRADE MARK REGISTERED
**ENGINEERING COMPANY • DURAND, MICHIGAN**

# ENGINEERED by TELSMITH

## TO PRODUCE 300 T.P.H. FOR NELLO L. TEER CO.



Telsmith Vibro-King Screen and one of three Gyrasphere Crushers

Two of this plant's three Telsmith Gyrasphere Crushers

Telsmith Heavy-Duty Apron Feeder feeds 30"x42" Primary Jaw

### TELSMITH
### Equipment in this plant

One (1) 42" x 14' Heavy-Duty Apron Feeder

One (1) 36" x 6' Heavy-Duty Plate Feeder

One (1) 5' x 12' Pulsator Double Deck Scalping Screen

One (1) 489 Special Coarse Gyrasphere Secondary Crusher

Two (2) 48 Fine Crushing Gyrasphere Tertiary Crushers

One (1) 5' x 12' Vibro-King Triple Deck Finishing Screen

One (1) 20" x 15' Twin Screw Classifier

Five (5) Telsmith-BG Conveyors, 18" to 30" wide, 72' to 150' long

● Large capacity of hard and abrasive granite, crushed to small sizes, features this Durham, North Carolina quarry plant. Telsmith-engineered-and-equipped to fit local conditions, it produces minus 1½" traffic-bound macadam, minus ¾" stone for asphalt plant, and minus 2½" concrete stone; all meeting North Carolina State Specifications, and used in black-top plants and for roads and concrete construction.

Reliable tests show a capacity of about 300 tons per hour of minus 1½" including about 70 tons per hour of minus ⅜" asphalt stone; or, about 170 tons per hour when producing all minus ¾" stone. Its three (3) Telsmith No. 48 Gyrasphere Crushers are responsible for this high capacity of small sized products.

Take your aggregate production problems to Telsmith Engineers. Send for Bulletin 266.

G-23

**SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN**

Cable Address: Smgworks, Milwaukee

51 East 42nd St. New York 17, N. Y. · 211 W. Wacker Drive Chicago 6, Ill. · 713 Commercial Trust Bldg. Philadelphia 2, Pa. · 238 Main Street Cambridge 42, Mass. · Boebek Eqpt. Co. Milwaukee 3, Wis. · A. N. Wigle, 362 S. Ashburton Rd. Columbus 13, Ohio

Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Eng. & Eqpt. Co., San Francisco 4, Calif. • Interstate Equipment Co., Statesville, N. C.

Rish Equipment Co., Charleston 22, & Clarksburg, W. Va. — Roanoke 7, & Richmond 10, Va. • Wilson-Wessner-Wilkinson Co., Knoxville 3, & Nashville 6, Tenn.

**HERE'S WHAT USERS SAY ABOUT THE DEMPSTER-DIGGSTER—**

# "IT'S THE FASTEST, MOST EFFICIENT EXCAVATING TOOL I HAVE USED"

**—A. J. METLER, *Contractor***

"During the past several years," Mr. Metler says, "I have owned and operated four conventional full revolving crawler and truck mounted shovels and cranes and know that they have a direct application to many types of excavating work.

"On the other hand, I have learned that the fast operation of the tricycle mounted Dempster-Diggster permits it to be used on certain types of work to a considerable advantage. Its mobility permits quicker transfer from one job to another.

"I have had excellent results from the Dempster-Diggster and consider it the fastest and most efficient excavating tool I have used."

Mr. Metler is one of the many contractors who has found the Dempster-Diggster to be "the fastest and most efficient excavating tool" available.

This speed and efficiency in excavation work is accounted for, mainly, by the Diggster's exclusive independent hydraulic crowd and hoist action, its hydraulic steering and wheel-type traction.

*The power crowd* permits bucket to keep digging until loaded . . . no digging with wheels. The hydraulic steering gives the driver sensitive, easy, finger-tip control. When accelerated, a one-handed twist of the steering wheel puts the machine in any desired position. By operating on rubber-tired wheels, the Diggster, of course, can move at the fastest possible speed on the job and to and from jobs.

The Type HL Dempster-Diggster is equipped for extraordinary high dumping. The bottom of bucket is 13 feet six inches above ground.

HERE IS THE NEW TYPE HL DEMPSTER-DIGGSTER shown excavating with a 1¼ cu. yd. (heaped) digging bucket. The Type HL Dempster-Diggster will dig through an 18 foot bank while the Type GRD digs through a 15 foot bank.

The Dempster-Diggster is a "must" for contractors, large or small operators alike.

The Dempster-Diggster has a 15 foot turning radius, is 20 feet long when bucket is in traveling position, and is nine feet and six inches in height.

*Four standard* interchangeable buckets of two types are available. Digging buckets with four bottom teeth in 1 and 1¼ cubic yard (heaped) capacities, and materials handling buckets in 1½ and 2 cubic yard (struck) capacities.

For fast, efficient operation in difficult terrain, the Diggster is available with crawler-type traction.

"I have not personally used the Dempster-Diggster mounted on crawler treads," Mr. Metler said, "but have seen it in operation on jobs adjacent to mine. I know it is a very effective tool and has many applications."

Construction men have found that on big jobs the Dempster-Diggster has no equal for working in tight places and for freeing big shovels for heavier work. The Diggster has an 8 foot 10 inch crowing reach, will dig through a 15 foot bank, and will dig 15 inches below grade.

*Pound for pound*, the Dempster-Diggster will out dig and out load any other available competing machine in tough going! Let us prove that statement!

Write today for complete information and prices. The Dempster-Diggster is a product of Dempster Brothers, Inc.

This is the type GRD Dempster-Diggster, which Contractor A. J. Metler considers "the fastest and most efficient excavating tool I have used." It is shown digging 15 inches below grade.

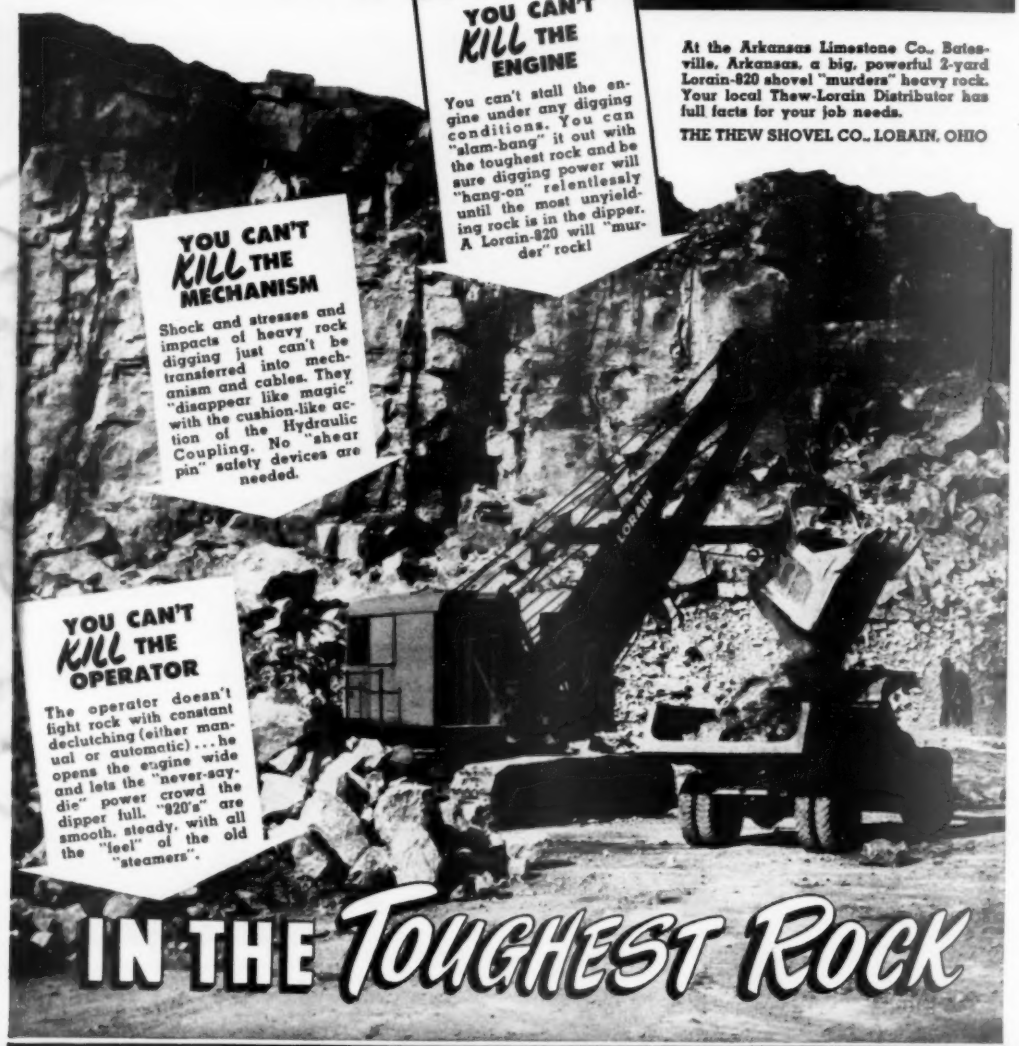
DEMPSTER DIGGSTER

**DEMPSTER BROTHERS**

**381 N. Knox**

**Knoxville 17, Tennessee**

# YOU CAN'T *KILL* THE LORAIN 820



**YOU CAN'T *KILL* THE ENGINE**

You can't stall the engine under any digging conditions. You can "slam-bang" it out with the toughest rock and be sure digging power will "hang-on" relentlessly until the most unyielding rock is in the dipper. A Lorain-820 will "murder" rock!

**YOU CAN'T *KILL* THE MECHANISM**

Shock and stresses and impacts of heavy rock digging just can't be transferred into mechanism and cables. They "disappear like magic" with the cushion-like action of the Hydraulic Coupling. No "shear pin" safety devices are needed.

**YOU CAN'T *KILL* THE OPERATOR**

The operator doesn't fight rock with constant declutching (either manual or automatic)... he opens the engine wide and lets the "never-say-die" power crowd the dipper full. "820's" are smooth, steady, with all the "feel" of the old "steamers".

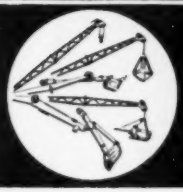
**At the Arkansas Limestone Co., Batesville, Arkansas, a big, powerful 2-yard Lorain-820 shovel "murders" heavy rock. Your local Thew-Lorain Distributor has full facts for your job needs.**

**THE THEW SHOVEL CO., LORAIN, OHIO**

## IN THE *Toughest Rock*

THEW **LORAIN**®

*on CRAWLER or RUBBER*



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

# Another Rotary Kiln Going Into Service

TO HELP MEET today's huge demands for cement, this 375-ft wet process kiln was recently put into operation by an Eastern cement manufacturer.

Cement plant operators in the United States and throughout the world have found Allis-Chalmers rotary kilns a *profitable* investment . . . in terms of low production costs, long, dependable service life and low maintenance. Here are some of the reasons why:

- Allis-Chalmers has unexcelled engineering experience and shop facilities for manufacturing kilns and maintenance parts . . . offers special facilities for *expediting* replacement parts from A-C shops directly to the customer with a minimum of delay.
- Allis-Chalmers has led the way in the development of rotary kilns to their present high production efficiency . . . has engineered such major improvements as centralized kiln control, the heat recuperating chain system, air-cooled feed and discharge ends, improved kiln feeders.
- Allis-Chalmers has had over a half century of experience in engineering and building equipment for *hundreds* of cement plants. A-C can cooperate in the design of a complete plant from the ground up—and furnish all equipment too. When you specify Allis-Chalmers you get *undivided responsibility* for *all* equipment!

The Allis-Chalmers representative in your area can give you the complete facts about Allis-Chalmers kilns. Call him or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B6368A.

A-3443

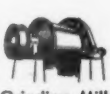
**ALLIS-CHALMERS**

A-C ALLIS-CHALMERS

**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**

Motors

Controls



Grinding Mills

Vibrating Screens

Gyratory Crushers

Jaw Crushers

# ASK THESE 10 QUESTIONS
## before you buy a diesel engine!

1 Is it a "true" diesel?

2 Does it have unit fuel injection?

3 Does it have four valves per cylinder?

4 Does it have distortionless pistons?

5 Does it have interlocking rods?

6 Does it have an extra heavy crankshaft?

7 Does it have dual overhead camshafts?

8 Are the camshafts driven from the flywheel end?

9 Does it have an integral hydraulic servo-type governor?

10 Is the cylinder block symmetrical?

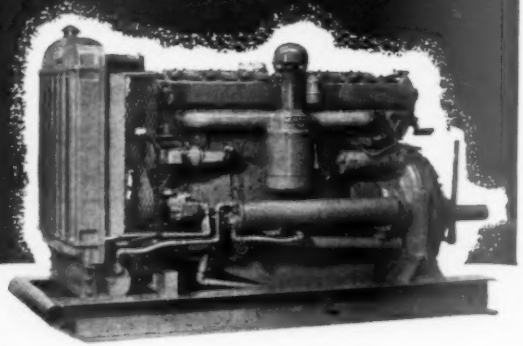
ASK these questions of any diesel engine salesman and you'll find that only the Murphy Diesel Salesman can answer "Yes" to all of them. From an operating standpoint ten "Yeses" mean you'll get more power, greater economy, greater dependability and longer engine life . . . just what you get with Murphy Diesels. Full information is given in the booklet *"10 Questions to Ask a Diesel Engine Salesman."* Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL

*Heavy duty power*

**for rock crushing**

Murphy Diesel Engines and Power Units for portable or stationary crushing plants, 90 to 226 H. P. 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W.

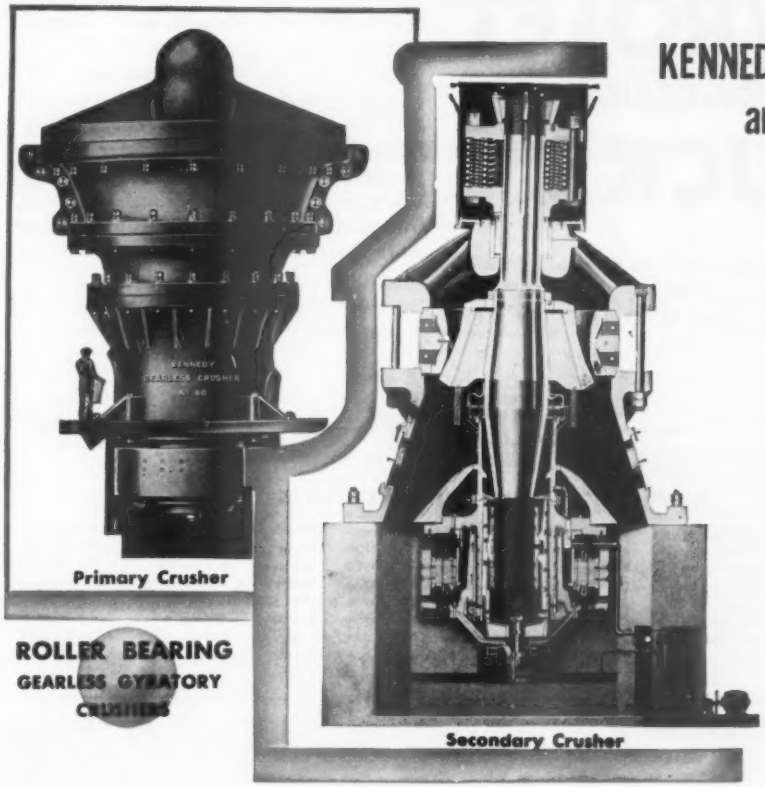


**MURPHY DIESEL COMPANY**

5315 W. Burnham St. Milwaukee 14, Wis.

*Sales, parts and service in principal centers*

IT COSTS LESS TO OWN THE BEST




ROLLER BEARING
GEARLESS GYRATORY
CRUSHERS

# KENNEDY CRUSHERS are really . . . . Rugged!

*Synchronous motor built into pulley assembly*

*Power applied ONLY for crushing*

*Force-feed lubrication*

*No gears to waste power*

*Added power at no added cost*

*Quiet — smooth Frictionless action*

*Varying capacities to serve every purpose*

***Designed and built*** to produce, economically and consistently, maximum loads of uniform products. Assures efficient service with minimum "time off for repairs" under the most severe operating conditions.

***Costs less in the long run*** because it has a larger capacity; uses less power; holds repair bills to a minimum; produces more and better rock tonnage, faster and at lower cost.

***Kennedy Crushers are made in various size units*** delivering from 12 to 3600 tons per hour. Engineered to serve your exact needs. Fifty years experience in the building of heavy duty crushers is your assurance that "It Costs Less To Own The Best" when you use KVS equipment.

***Send for bulletins describing, fully, all types of KVS crushers***

**KENNEDY-VAN SAUN MFG. & ENG. CORPORATION**

# Cut Cooling Costs *these 3 Ways*

## 1. CUTS ROTARY KILN FUEL COSTS

Air-Quenching grate cooler actually returns 75% of sensible heat in clinker back to kiln as secondary combustion air. Clinker is cooled quickly, to a temperature where handling is no problem, by means of cooling air coming up through the relatively thin bed of hot material on grate.

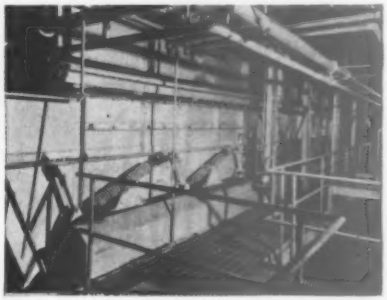
## 2. CUTS CLINKER GRINDING COSTS

Air-quenched clinker is easier to grind — capacities of clinker grinding mills handling hard-to-grind clinker have been increased as much as 10% with the installation of an air-quenching grate cooler. Rapid cooling also helps nullify the detrimental effects of magnesia in clinker.

## 3. CUTS MAINTENANCE COSTS

Reciprocating motion of grate is carried on flexible rubber bushings and springs. No wearing parts and no slippage. Clinker does not slide on grate, it hops, gently and steadily. Lubrication is negligible, only four grease fittings on entire cooler. Maintenance cost runs as low as 1/10 cent per barrel.

**COOLS 100 BARRELS AN HOUR FROM 2500° TO 90° F.**
**In the modern plant of Dewey Portland Cement Co., Davenport, Iowa, this 4½ x 70 ft Allis-Chalmers air-quenching grate cooler cools 100 barrels of cement clinker per hour from 2500° F. to approximately 90° F. It's one of three Allis-Chalmers grate coolers installed here.**






### *Save on Installation Cost, Too!*

The air-quenching grate cooler comes as a complete unit, fits into existing plants readily because it operates horizontally. Installation costs are 10 to 30 percent less than the cost of installing any other type of cooler! Get more facts from the Allis-Chalmers representative in your area, or write for Rotary Kiln Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.

*Pulverator is an Allis-Chalmers trademark.*

**ALLIS-CHALMERS**

A-3291

**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**


*Pulverators*

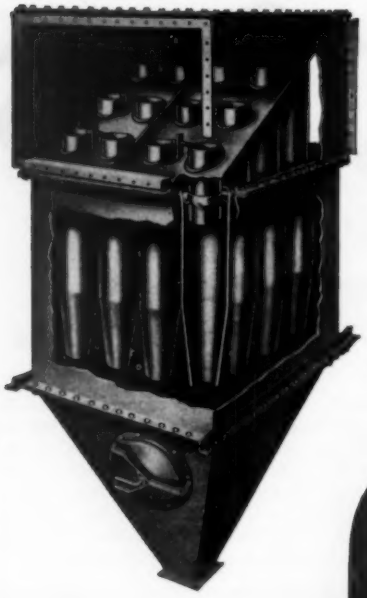

Vibrating Screens


Jaw Crushers


Grinding Mills


Gyratory Crushers


Kilns, Coolers, Dryers



**No wonder "MULTICLONE" *is the leading name in the centrifugal recovery of dust and fly ash from all types of gases, hot or cold.***

No other mechanical recovery equipment has so many years of dust and fly ash recovery experience behind it . . . or has such uniformly high collecting efficiency . . . or provides so many other money-saving, space-saving advantages as MULTICLONE. The four advantages outlined below are by no means the complete MULTICLONE story, but are typical of the vital savings found *exclusively* in MULTICLONE equipment . . .

**In dust and fly ash recovery**

# MULTICLONE COLLECTORS

***and only Multiclones* give vital advantages like these . . .**


## Uniformly High Recovery:

MULTICLONE'S multiple *small diameter* tubes—made possible by its exclusive vane design—whirl the dirty gases with greater centrifugal force, thus throwing out not only the large, medium and small particles, but also a high percentage of the *extremely small* particles of 10 microns and less. This, coupled with the fact that there are no pads or filters to become choked with recovered material, results in a more complete recovery of *all* suspended materials from the gas stream.

Long and narrow

Square

## Maximum Adaptability:

In addition to its unusual compactness, the MULTICLONE is also unusually adaptable to various installation requirements. Where head room is low it can be installed with side-inlet side-outlet connections. Where side clearances are restricted, it can be installed with side-inlet top-outlet connections. In addition, without changing capacities, the shape of the unit can be varied—long and narrow, short and wide, or square—to fit restricted spaces . . . and its single-inlet single-outlet duct requirements permit greater flexibility and simpler installation. These savings slice installation costs, space requirements and insulating expense.

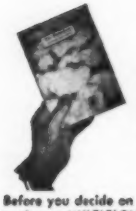
## Space-Saving Compactness:

Plant space costs money—so be sure to check space requirements carefully. As shown in the accompanying chart, the MULTICLONE requires less floor space and less cubic space than any other unit of comparable capacity and performance. Translate these savings into today's high costs for plant space and you readily see the great importance of this one MULTICLONE advantage alone!

| Make | Relative Space Requirements In Sq. Ft. | In Cu. Ft. |
|---|---|---|
| Multiclone | 1.0 | 1.0 |
| Collector A | 2.1 | 1.8 |
| Collector B | 5.9 | 3.2 |
| Collector C | 6.8 | 3.9 |

## Minimum Maintenance:

The MULTICLONE has no high speed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. MULTICLONE draft losses remain uniformly low *at all times*. Further, the recovered material from an entire bank of tubes is collected in a *single* hopper—far easier to service and maintain than the multiple hoppers of conventional cyclone units.



**FREE INFORMATIVE BOOKLET**
This 32 page booklet outlines the basic principles of centrifugal dust recovery and shows the many ways MULTICLONE advantages assure higher recovery at lower overall costs. A free copy of this booklet will gladly be sent on request. Write today!

Before you decide on any recovery equipment be sure to get complete information on MULTICLONE advantages. A letter, wire or phone call to our nearest office places this information in your hands without obligation. Get all the facts and you will get MULTICLONE Collectors!

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1006 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
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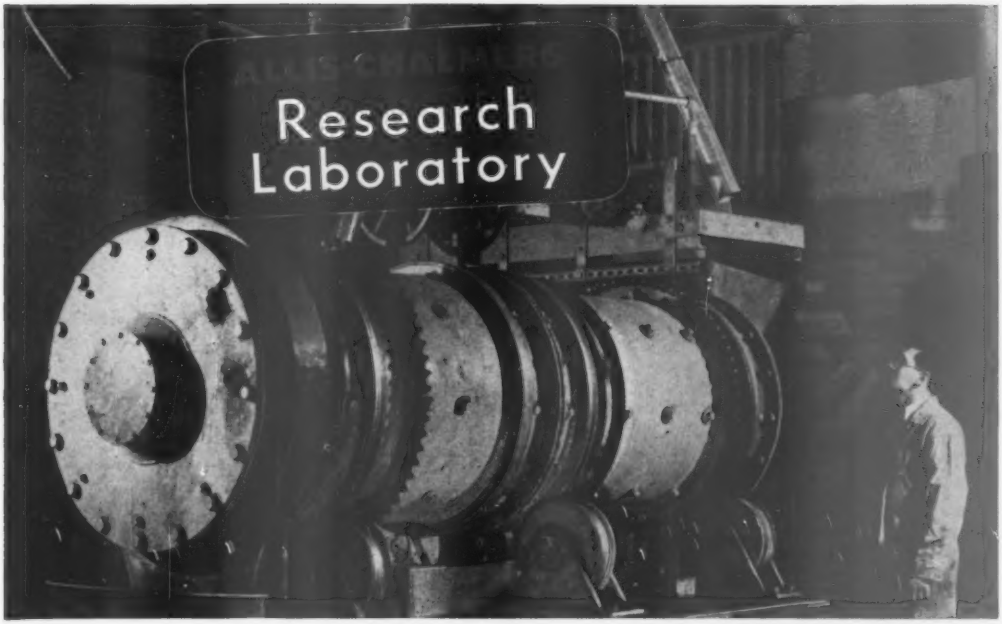


# How Lab Tests Reduced Initial Plant Cost

A PROCESSOR wanted to find a low cost method of crushing and dry grinding lead slag to a carefully controlled product of 98% passing 10 mesh. A method had been worked out previously which would meet these size specifications but which required a considerable amount of costly auxiliary equipment. The customer hoped that a simpler method might be found.

A 20-ton sample was sent to the Allis-Chalmers Research Laboratories for a pilot plant test run. Proper operating conditions were established, and it was proved that the required reduction could be achieved by open circuit dry grinding in an end peripheral discharge rod mill with no auxiliary equipment.

As a result of the Laboratory tests, this company was able to save money on the original plant investment. Simplified plant layout also resulted in low maintenance.

## CAN YOU USE THESE FACILITIES?

The Allis-Chalmers Processing Laboratory was established to help you work out profitable solutions to processing problems. It contains modern equipment for batch and pilot mill tests in grinding, crushing, sizing, concentrating, pyro-processing, chemical and physical analysis.

The Laboratory's purpose is to develop new or more efficient processing methods...to determine the economics of a process prior to full-scale operation . . . to provide engineering information to guide in designing efficient plants . . . for virtually any type of industry.

Facilities of the Laboratory are available to anyone in industry. Charges are based on costs. Estimates for test work can be obtained from A-C district offices or from Allis-Chalmers Processing Laboratory, Milwaukee 1, Wisconsin.

A-3484

**Send For Your Copy Today**

**Laboratory Bulletin 07B6419B**

Allis-Chalmers Mfg. Co.
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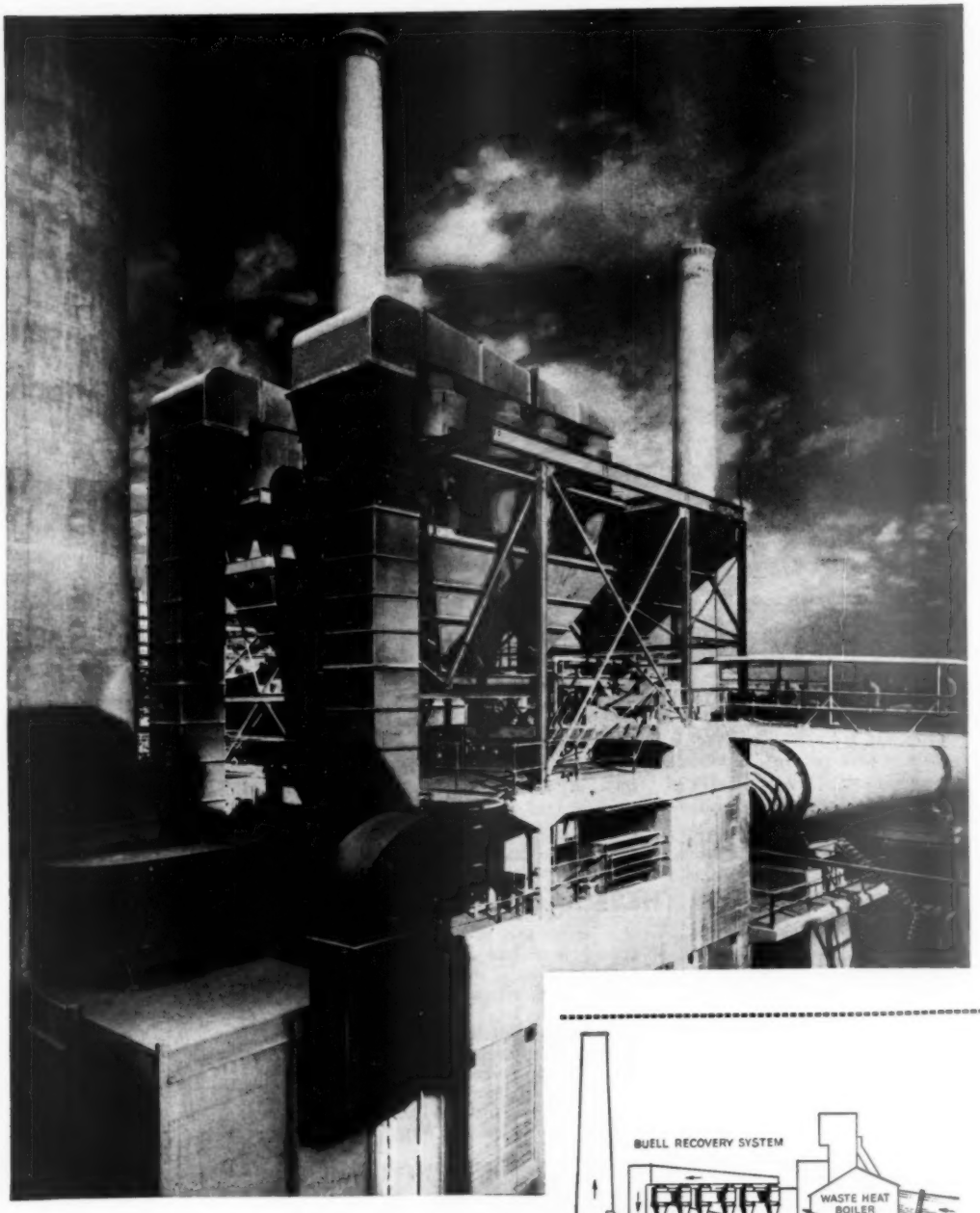
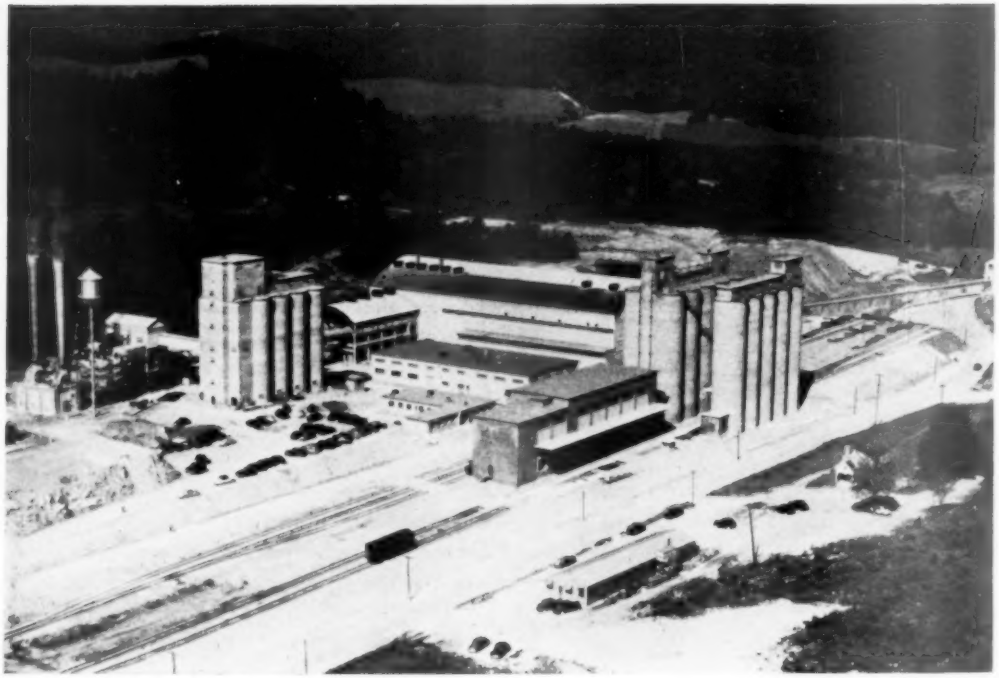
# ALLIS-CHALMERS

**Processing Research Laboratory — Dedicated to a Better Utilization of our Raw Materials**

# In Cement and Lime Kiln



# IN THE BLUE RIDGE MOUNTAINS OF VIRGINIA



Near Roanoke, this modern plant of the Lone Star Cement Co. includes the final word in packinghouse and baghouse design, raw mix blending and storage silos for the dry process, and self cleaning cone hopper bottom cement storage silos with special arrangement for handling mortar cement and bulk loading.

***For design and construction of your new plant or extensions, contact us at any of our offices***

## MACDONALD ENGINEERING CO.

***Construction Engineers***

**C.P.R. Building**
**Toronto, Canada**

**188 West Randolph Street**
**Chicago**

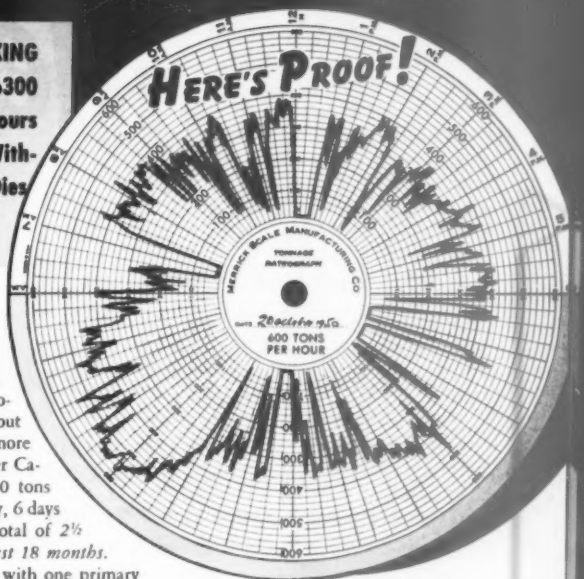
**885 Bryant Street**
**San Francisco, Cal.**

# *Reduces* 2½ MILLION TONS

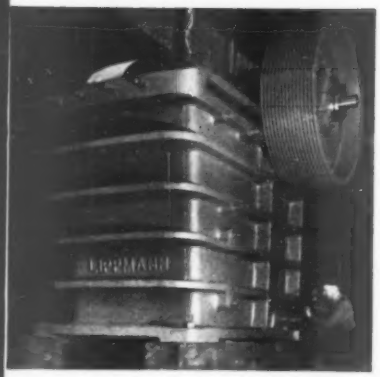
## of Blast-Run Niagara Limestone to Minus 3 in. IN 18 MONTHS . . . WITH ONE CRUSHER!

**Miron Brothers Fastest Growing Aggregate Producer in Canada . . .**

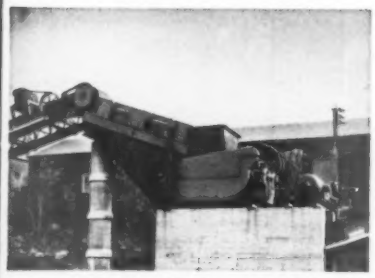
**Rock-Ravenous 36 x 48 GRIZZLY KING Jaw Crusher Often Produces 6300 Tons per Day . . . Works 20 Hours a Day, 6 Days a Week Without Shutdowns! And Jaw Dies Haven't Even Been Turned!**




**Actual weight chart of a typical day's production, recorded by scale under discharge conveyor, is proof that Grizzly King's output reaches 560 tons per hour.**



**In complete Lippmann plant, Miron Bros. makes six sizes of stone — everything from ag-lime to ballast rock.**



**Other Lippmann equipment at Miron: two 48 x 24 roll crushers, five 5 x 12 Screen-All vibrating Screens, 591 ft. of belt conveyors with Life-Sealed Ball Bearing Idlers.**

Two years ago the site of the Miron Bros. plant at Ville St. Michel, Quebec, was a farm. Today they are turning out what is believed to be more aggregate than any other Canadian producer — 300 tons per hour, 20 hours a day, 6 days a week—the amazing total of 2½ *million tons in their first 18 months.*

And they're doing it with one primary in a plant that's completely Lippmann-engineered and Lippmann-built . . . from the 36 x 48 GRIZZLY KING Jaw Crusher, the world's highest capacity overhead eccentric, through scalper, belt conveyors with Life-Sealed Ball Bearing Idlers, Screen-All Vibrating Screens with perfect-circle throw, and Roll Crushers.

They're feeding hard, blast-run Niagara Limestone up to 36 in. directly to the GRIZZLY KING, with the discharge opening set *down to 3 in.* And the crusher actually idles a good share of the time!

### Amazing Capacity!

There isn't another crusher built that approaches GRIZZLY KING's capacity — extra long jaws, engineered crushing action, complete oil lubrication and alloy steel construction add up to the rock-eatingest crusher on the market today. And its low-maintenance operation is proved by the fact that Miron *hasn't even turned the jaw dies* after 2½ million tons.

You, too, can pile up extra profits with the world's lowest-cost-per-ton-crushed rock and ore machinery. And Miron is doing all this with an *investment of only $125,000* in super-capacity, low-cost Lippmann equipment.

Write today for all the facts on the complete line of Lippmann machinery for pits, mines and quarries. Follow the example of leading operators the world over who choose Lippmann above all other makes.

2008

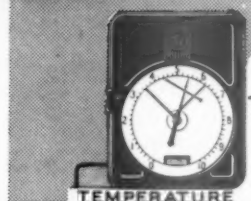
**WRITE FOR ALL THE FACTS**
**on the complete Lippmann line for pits, mines and quarries:**

Grizzly King Jaw Crushers (Bulletin 1100), Screen-All Vibrating Screens (1200), Belt Conveyors (1400), Pulverizers (1160), Life-Sealed Ball Bearing Idlers (1410), Gyra-Gnome Secondary Crushers, Circuit Rider Self-Propelled Crushing Plants, Portable Washing Plants (1650), Apron Feeders (1450).

# LIPPMANN ENGINEERING WORKS

4603 W. MITCHELL STREET
MILWAUKEE 14, WISCONSIN

# Now! "Self-Serve" Operation - Bailey Meter



TEMPERATURE RECORDER-CONTROLLER

FUEL FLOW-AIR FLOW METER

Your "Self-Serve" Bailey controlled rotary kiln literally thinks for itself and reacts quickly and correctly to any changes in operating conditions. You get:

1. **Economical Operation**—*Gives maximum production from every unit of fuel you burn* because Bailey Combustion Control closely guards Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and Temperature of Air for Combustion.

2. **Uniform High Quality of Product**—Accurate measurement and control of Kiln Speed, Burning Zone Temperature, Combustibles Content and Oxygen Content . . . *for a high grade product, consistently.*

3. **Minimum Maintenance**—Uniform excess air conditions and constant temperatures *prolong the life of your kiln.* Costly refractory repairs and wear and tear on auxiliary equipment are reduced to a minimum.

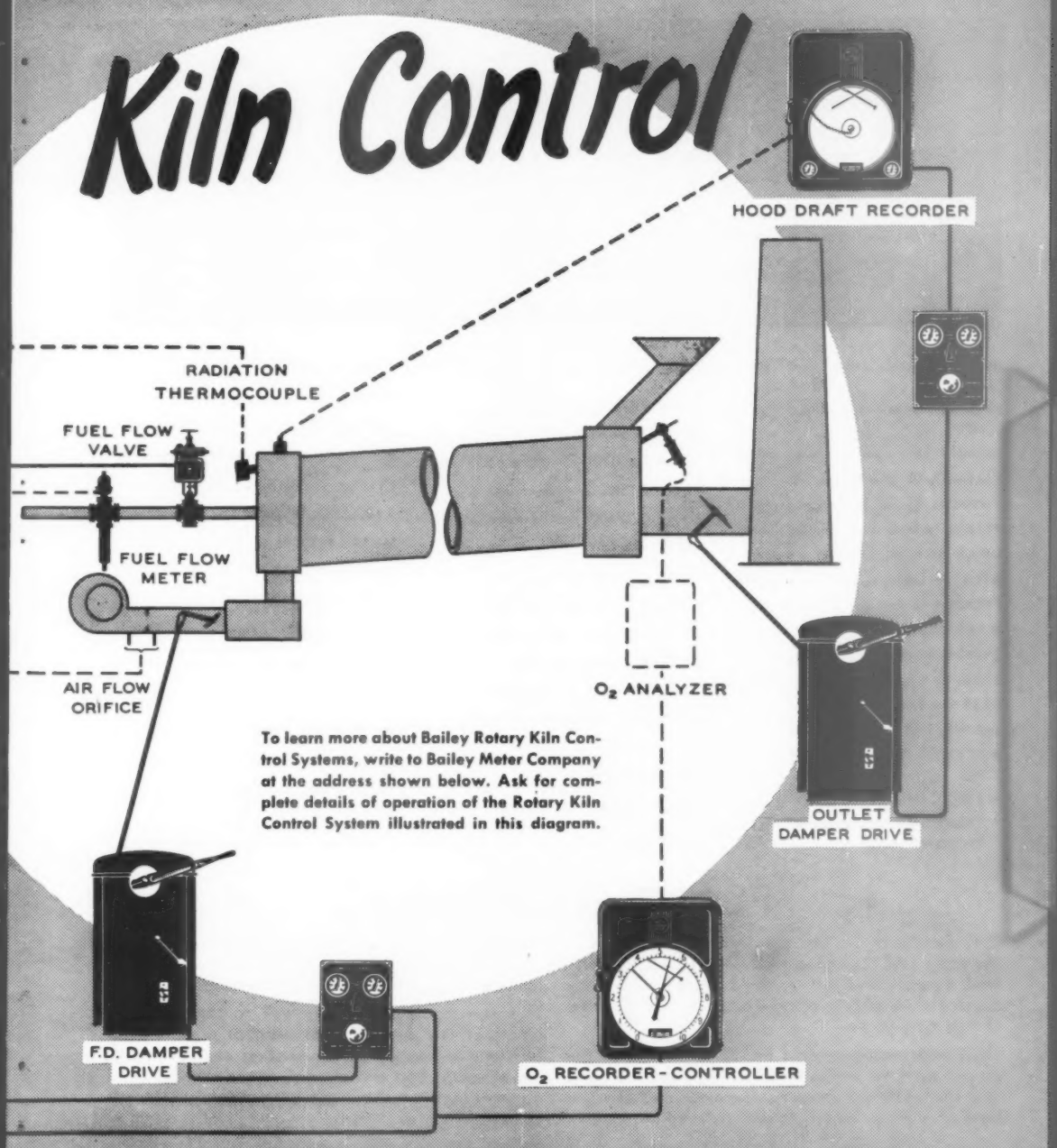
The accompanying diagram shows one way in which Bailey instruments and controls can give you a "Self-Serve" Kiln. Other arrangements to suit the requirements of any rotary kiln are available.

Bailey Meter Company maintains a staff of engineers who are experts in the control of rotary kilns. Let one of these men help plan a control system to give you a "Self-Serve" rotary kiln.

P-23

**Bailey Meter Company**

# Kiln Control




**To learn more about Bailey Rotary Kiln Control Systems, write to Bailey Meter Company at the address shown below. Ask for complete details of operation of the Rotary Kiln Control System illustrated in this diagram.**

Meters and Control Systems for Process Plants

1039 IVANHOE ROAD • CLEVELAND 10, OHIO

Bailey Meter Company Limited · Montreal

# "WE HEAR..."

August, 1951

An additional $40,000,000 has been requested by the Defense Minerals Administration for the strategic mineral exploration program for the 12 months beginning last July 1. The program, in which the government pays part of the cost of seeking new mineral sources, has already been granted a $10,000,000 allotment for the first two months.

* * * * * * * * * *

It was recently predicted that cooperative apartments may boom when other housing construction sags. Since last December, the Federal Housing Authority has received loan applications to finance the building of 46,000 co-op units. This type of apartment, in which the buyer is part owner and part tenant, can be financed by FHA mortgages on easier terms than federal credit controls permit for others.

* * * * * * * * * *

Construction in May, 1951, in the 37 states east of the Rockies totaled $2,572,961,000, or 87 percent higher than the preceding month, and 91 percent higher than in May, 1950, according to an F. W. Dodge Corp. report. The total for the first five months of 1951 was $7,399,177,000, or 34 percent more than the comparable figure for 1950. The biggest gain was in non-residential construction which was up 89 percent over the first five months of 1950. Residential construction was up 6 percent; public and private works and utilities were up 8 percent. Boosting the non-residential classification for May, and in turn, the general construction total, were three atomic energy projects with awards totaling $980,000,000.

* * * * * * * * * *

Effective May 1, Sundays have temporarily been removed from the operation of Service Order 856 covering demurrage on freight cars held beyond the free time. Under the new order, Saturdays, but not Sundays, will be treated as working days and counted in the computation of demurrage regardless of whether or not the free time has expired.

* * * * * * * * * *

An eastern coal company is making plans to transport coal through pipelines and has awarded an engineering contract to a Chicago company for a $550,000 demonstration-size pipeline system in eastern Ohio, as reported in Constructioneer. After coal is mined, it will be washed and crushed to fine size; it then will be mixed with water to form a slurry which will be fed into the pipeline and moved under pressure by pumps. Equipment at the end of the line will remove the coal and dry it.

* * * * * * * * * *

It was recently reported in The Wall Street Journal that a shortage of junkyard scrap metal may slow down steel production. One midwest steel executive was reported as saying, "I look for a production cut of from 5 to 10 percent in the next 30 days at our mills, unless something is done to give us a better supply of scrap."

* * * * * * * * * *

The new Fairless Works of United States Steel Corp. at Morrisville, Penn., will have a capacity of 1,800,000 tons of steel ingots annually. If operating at full capacity, it was stated that enough steel could be produced for all of the following: ten aircraft carriers; 500 airplanes; 500,000 3-in. shells; two heavy cruisers; 500 army tanks; 10,000 freight cars; 300,000 automobiles; and 574,000 household refrigerators.

## WE HEAR

A large discovery of bauxite has been made in Jamaica. Reynolds Metal & Aluminum Co. has signed a 200-year lease with the owner of the property where the discovery was made, for the mining of the newly found ore. Jamaica is said to hold the largest deposit of bauxite in the world.

* * * * * * * * * *

It was recently reported in Chemical and Engineering News that a silicated rubber coat exterior finish has been developed which is claimed to solve the problem of patching and painting stucco, cement, and masonry of all types, in a one-coat application. This finish is said to bridge hair-line cracks, acting as filler and finish coat combined, and to be long lasting. It comes ready mixed in white, or can be had as concentrated additive for mixing with the rubber coat tints.

* * * * * * * * * *

Freight-car construction in May neared the U.S. goal of 10,000 cars per month. During the month 9774 cars were produced, as against 8274 cars in April. Strikes in two plants reduced construction by more than 300 cars, keeping production from passing the 10,000 mark. Orders for new freight cars placed in May totaled 4919, bringing the backlog, as of June 1, to 150,628. This compares with 155,871 cars on order May 1. With the N.P.A. cut in steel allocations starting last July 1, production was expected to be decreased by about 23 percent.

* * * * * * * * * *

Engineering construction for the first 23 weeks of 1951 totaled $6,551,800,000, a gain of 35 percent over the same period in 1950, as reported by Engineering News-Record. Private construction totaled $3,894,800,000, a gain of 42 percent, and public works amounted to $2,657,000,000, a gain of 26 percent. Federal construction is running 57 percent higher than last year, while state and municipal awards are up 12 percent.

* * * * * * * * * *

An explosion in a tank of asphalt, used for treating burial vaults manufactured by a concrete products company in Ohio, caused damages amounting to approximately $5000. Supplies of asphalt and a number of burial vaults were damaged by the blaze. It was said that the heat was so intense that it melted asphalt and warped steel "I" beams in the building.

* * * * * * * * * *

Great Lakes area carloadings in the third quarter of 1951 are expected to run 2.4 percent above the like period of 1950, as predicted by the Great Lakes Regional Advisory Board. It was estimated that 764,280 cars will be loaded in the current quarter, compared with loadings of 746,624 cars in the corresponding period of last year. Among the commodities in which increases in car loadings are expected are: gravel, sand and stone, 11.1 percent; cement, 16.9 percent; brick and clay products, 20.5 percent; ore and concentrates, 8 percent; iron and steel, 8.5 percent; non-ferrous metals, 4 percent; and chemicals and explosives, 6.7 percent.

* * * * * * * * * *

Featured in a Technical Reports Newsletter, published by the Office of Technical Services of the U. S. Department of Commerce, is a report telling how bamboo may be substituted for steel in reinforced concrete.

* * * * * * * * * *

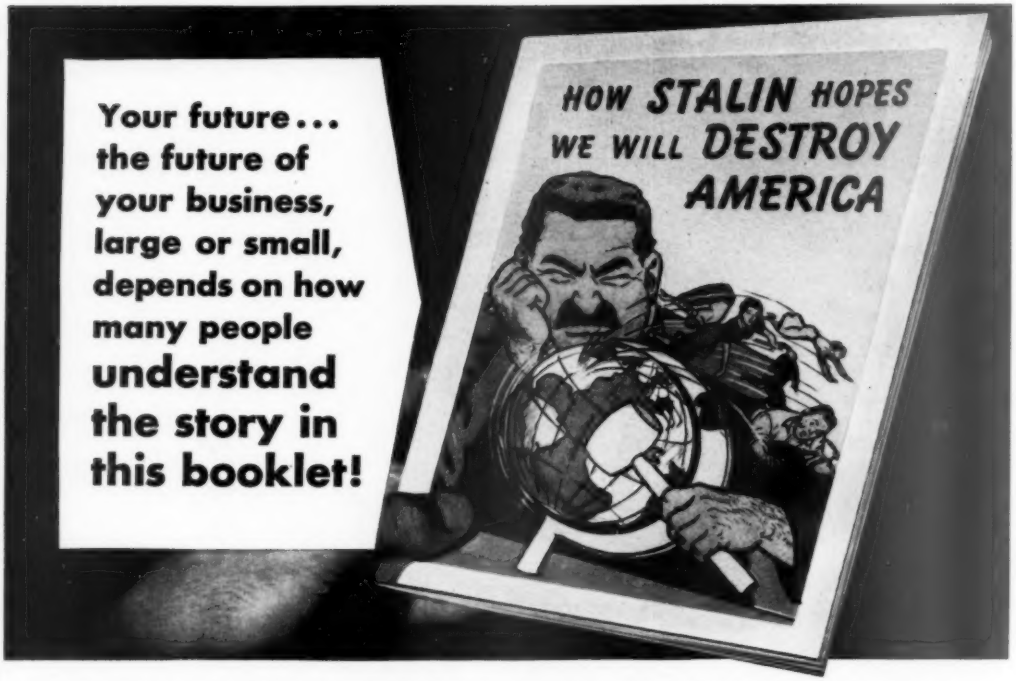
Complete allocation of steel, copper and aluminum in the fourth quarter of this year is expected, due to the announcement by the National Production Authority that consumer "hard goods" will be brought into the Controlled Materials Plan during that period. The C.M.P., as now in effect, is only for producers of military and defense program items.

* * * * * * * * * *

The freight-car shortage has eased temporarily, but a new "pinch" is expected by fall, according to a report in The Wall Street Journal. Demand for box cars is at its lowest point since June, 1950. Among reasons given for this were: faster delivery of new cars; a drop in retirement of worn-out cars; and fewer cars awaiting repairs. Early this year, the shortage was running as high as 30,000 cars per day. The average daily shortage in June had declined to 5000, while some areas even reported a surplus. The recent cut in steel allocations may reduce the new car output and put deliveries behind schedule; also, a surge in armament output by late this summer plus a seasonal step-up in industrial activity is expected to make the pinch as tight as ever by fall.

THE EDITORS

# There IS something YOU can do ABOUT INFLATION!




*Businessmen recognize* ***inflation*** *as the nation's greatest single threat. But most of us have felt "What can one man—even one business—do to stop it?"*
*But there is a way—if enough of us work at it. We can help more people . . . the men and women who work and vote and pay taxes . . . to understand the nature of inflation, its* ***causes*** *and* ***cures****. Then we will have gone a long way toward eliminating this pending catastrophe.*

**ONE TOOL YOU CAN USE:** To help us give our own Bemis workers the inflation picture, we used the colorful, new 16-page booklet "How Stalin Hopes We Will Destroy America" produced by Pictorial Media, Inc. The more widely the booklet is used, the more good it will do . . . and it is available for distribution to your workers, too. It follows the time-proven "comic book" technique . . . dramatizes the dangers . . . and shows how all our citizens can help halt inflation before it's too late.

**TESTS SHOW IT HELPS WORKERS:** To get an impartial judgment of the value of "How Stalin Hopes We Will Destroy America," it was tested in Bemis plants by the Psychological Corporation under the direction of Dr. Henry C. Link, a foremost research authority. Dr. Link says "Those workers exposed to the booklet were found to have a significantly higher appreciation of the recommended ways to stop inflation than did the workers who did not see the booklet. Details of this test are available upon request." And Bemis factory workers make such statements as "Everything it says hit home, but you'd never figure it out for yourself until you read it"...."It's told in an interesting way so anyone can understand. My daughter, age ten, understood all of it"..."In picture form it impresses you more. Most people don't read about it"..."Had ideas that we wouldn't think about otherwise while we are working away—good book, agree with it—I guess I won't be the only one."

Because we believe this message is growing more urgent every day, Bemis is taking this means to commend to other businesses this weapon against inflation. It is the first of a series of such material that we expect to use.

**BEMIS BRO. BAG CO.**
St. Louis 2, Missouri

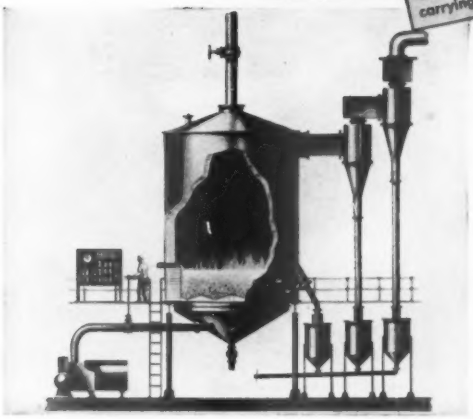
**FOR EVERY BUSINESS, LARGE OR SMALL: In quantities, it costs only a few cents a copy—$10.00 for 100 copies, down to 3 cents per copy in larger quantities. Single copy free. For full information, write PICTORIAL MEDIA, INC., Attention: Paul Wheeler, 205 E. 42nd ST., NEW YORK 17, N.Y.**

## Can you use

# 14-15% $SO_2$ GAS from PYRITE

***Dorrco FluoSolids* will produce it . . . at lower investment and operating costs than conventional roasters.***

**FACTS ON $SO_2$ PRODUCTION BY FLUOSOLIDS**



**GAS STRENGTH** will average 14-15% $SO_2$ dry basis from pyrite carrying 48-50% sulphur.

**GAS CLEANING EQUIPMENT** is smaller because of smaller gas volumes.

**FEED** can be relatively coarse . . . flotation concentrate to 35 mesh—jig or table concentrate to 14 mesh.

**MINIMUM MAINTENANCE** . . . no moving parts exposed to high temperature—long refractory life.

**NO SCALING** . . . temperature accurately controlled below fusion point.

**NO EXTRANEOUS FUEL** is needed once fluidized bed is up to calcining temperature.

**PROCESS SHUT-DOWNS** of two or three days present no roasting problem.

**COMPLETE INSTRUMENTATION** eliminates the personal factor in operation.

● Sulphuric acid manufacturers and all users of sulphur dioxide faced with a shortage of elemental sulphur will find in FluoSolids an economically feasible means of tapping sulphides as an alternate source of $SO_2$. Utilizing the principle of fluidization, The Dorrco FluoSolids System is a distinct departure from conventional roasters. It brings $SO_2$ production from those sources down to a reasonable investment and operating cost level.

Its economy, simplicity and ease of operation are indicated by the facts above. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street West, Toronto 1.

*FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better Roads TODAY

DORRCO

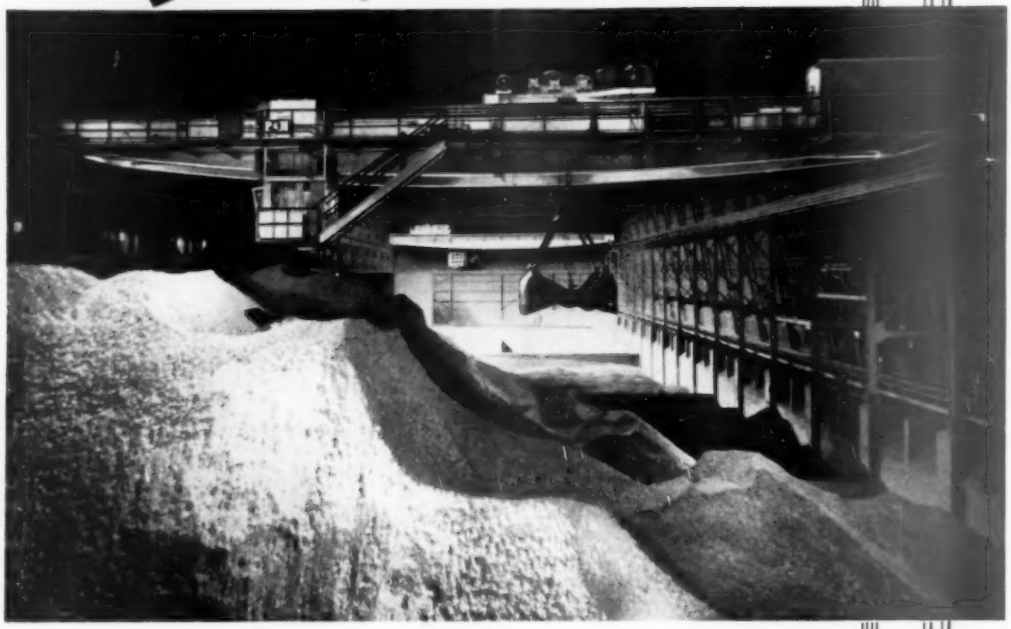
DORR

WORLD - WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

Associated Companies and Representatives in the principal cities of the world

# IT'S P&H OVERHEAD CRANES AGAIN!



## AT MISSOURI PORTLAND CEMENT'S ULTRA-MODERN PLANT

Here's an example of the way P&H Overhead Cranes are *engineered* to fit the job — to keep materials moving fast — dependably — at rock bottom cost.

These two P&H Cranes (15-ton capacity with 100 ft. span) with 5-yard grab buckets serve the 400-foot long storage building.

Because dust is a problem, the modern, totally enclosed, insulated cab is equipped with an air-conditioning unit, located on the service platform directly above it. Air is both filtered and refrigerated to assure operator comfort regardless of atmospheric conditions in the building.

Knowing the user's needs and engineering cranes to properly fit them has kept P&H in the forefront for more than 65 years. Whatever your crane problems may involve, P&H has the answers — and the Added Values to go with them. Write us.

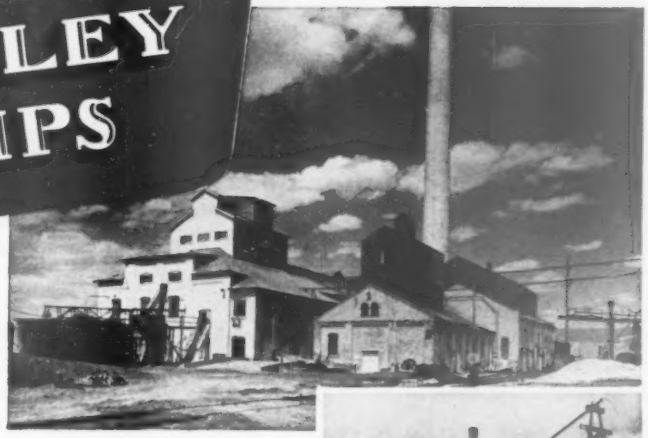
P&H OVERHEAD CRANES
4465 W. National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

OVER 17,000 P&H CRANES SERVE AMERICAN INDUSTRY... FAR MORE THAN ANY OTHER

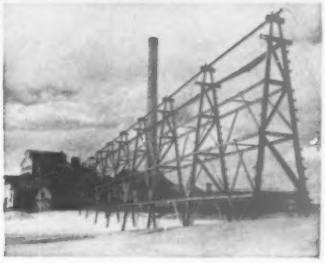

POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FAB HOMES

# WILFLEY PUMPS

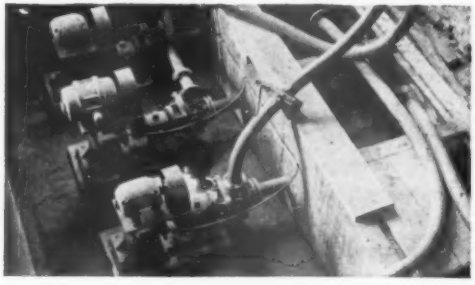
## Used At...



# Climax URANIUM PLANT



The great CLIMAX URANIUM COMPANY PLANT at Grand Junction, Colorado, built primarily for uranium processing, uses WILFLEY pumps throughout. WILFLEY Model K sand, Model AF acid, and plastic lined acid pumps maintain continuous, trouble-free, high-efficiency performance with leaching solutions, tailings, vanadium and uranium leach liquors, dilute acids, sand slime, roaster calcine and other chemical solutions. Individual engineering on every application. Buy WILFLEY for lower production costs. Write or wire for details.



**Plastic Lined Pumps in Tank House.** *These acid-proof pumps receive vanadium and uranium leach liquors from leaching tanks and pump them to various treatment tanks located in the main portion of the building.*

**Grind Circuit Circulation Model K Pumps.** *These sand pumps receive the classifier overflow and pump the material to the sand slime separation circuit located at a higher elevation.*

**A. R. WILFLEY & SONS**, Inc., Denver, Colorado, U.S.A., New York Office: 1775 Broadway, New York City

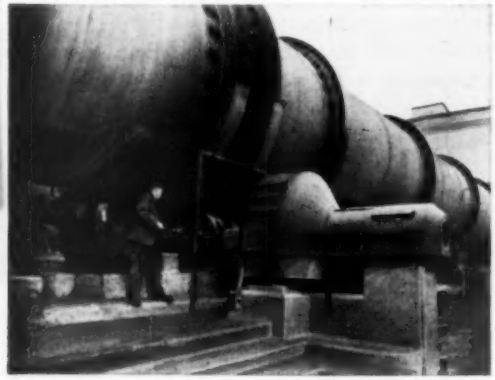
# CONTROL BURNING

## Modernize electrically with adjustable-speed drives to more accurately co-ordinate kiln rotation and rate of kiln feed for higher quality and greater cement output!

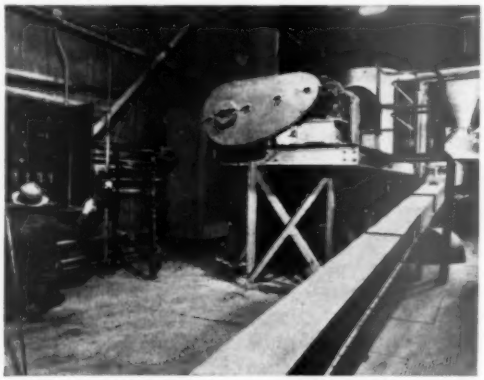
It's a "must" for cement mills today. For maximum cement production and uniformity, all phases of the burning process—kiln rotation and kiln feed—should be closely synchronized and fuel feed precisely controlled.

**The right drive to fit your requirements.** That's why many cement mills are installing modern General Electric adjustable-speed drives that provide accurate, easily-regulated speed control and close speed co-ordination of kiln feeder and kiln. Available in many types, they include the well-known d-c adjustable-voltage system.

**Save time, effort, worry!** Moreover, to simplify and hasten modernization of *your* mill, General Electric can co-ordinate the selection, manufacture, and delivery of all the G-E equipment, saving you and your staff time, effort and worry—and assuring you a reliable, integrated electrical system. And whether you order individual motors and control, or all the electric equipment needed for a completely modernized department, you get the help of an experienced G-E representative. Call your nearest G-E office today! *General Electric Co., Schenectady 5, N. Y.*



**2** **Here is a close-up** of one of the G-E kiln motors coupled to a transmitter (both under weather covers). Selsyn transmitter—rated 10 hp, 440 volts, speed range 750/375—actuates selsyn receiver in kiln feed house to co-ordinate kiln feed and kiln rotation.



**3** **In the kiln feed house,** feeder units consist of three 31-tons-per-hour feeder screws. The selsyn-receiver controller, similar in construction and rating to the selsyn transmitter, regulates the speed of the kiln feeder screws to correspond to that of the kiln.

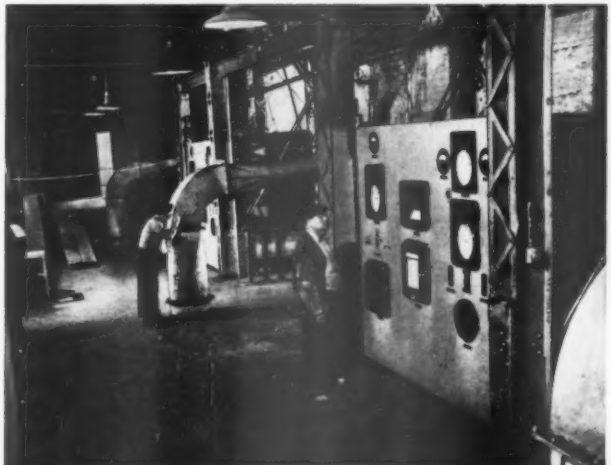
*You can put your confidence in—*

**GENERAL ELECTRIC**

658-6

# MORE ACCURATELY

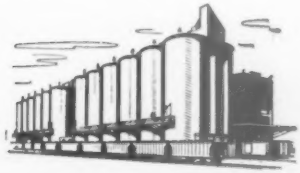
1 **In this large Eastern cement plant** using the dry process, three kilns, 233 feet long, 12 feet in diameter, are driven by G-E adjustable varying speed motors rated 125 hp, 550 volts, 25 cycles, 750/375 rpm, equipped with selsyn transmitters electrically connected to feeder units.

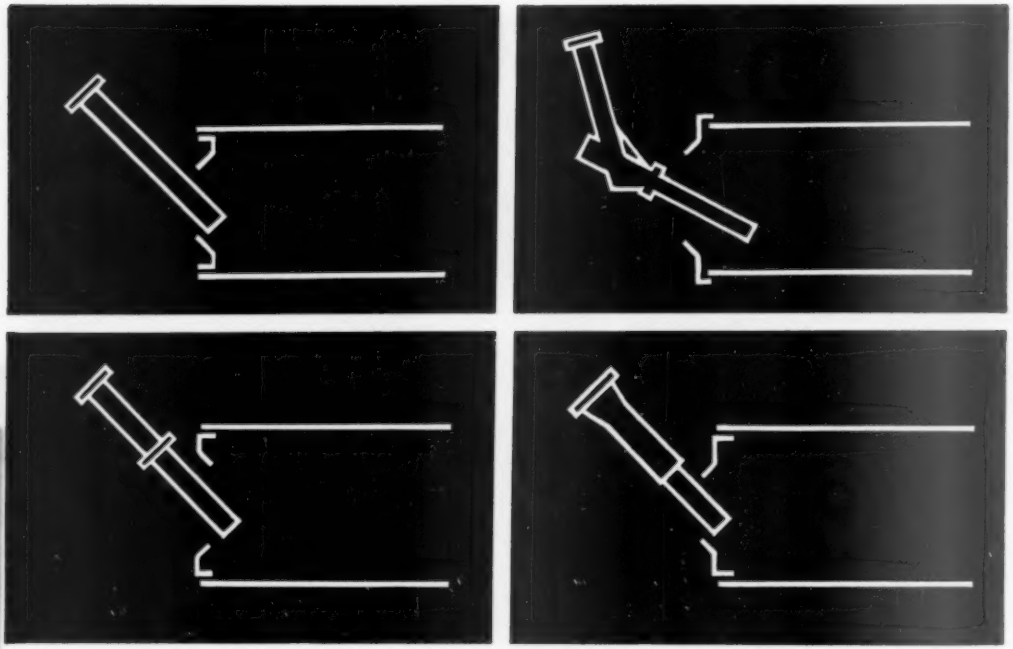


4 **Control of the entire burning process** is centralized on the burner's deck shown here. A panel for each of the three kilns incorporates all the indicating and recording instruments to enable the burner to accurately control the entire clinker-burning process.

## Where can *you* profit by electrical modernization?

Kiln operation is only one of several cement-plant processes that offer opportunities today for increased efficiency through electrical modernization. Whatever department *you're* going to modernize—from quarry to packhouse—your best bet for a smooth-working installation is to talk it over with your G-E representative. Call him in at an early stage in your planning!





# THERMALLOY* Feed Ends and Feed Pipes are EASY TO INSTALL

Thermalloy "40" kiln feed end of segmented cone design.

Thermalloy "50" feed pipe section flanged on each end.

Thermalloy feed pipe assembly of unique "angled" design.

The diagrams above show some of the many ways in which Thermalloy feed ends and feed pipes can be adapted to your kiln requirements.

No special "built-up" brick feed ends are necessary, thus reducing installation costs. The segmental design of Thermalloy feed ends prevents cracking due to expansion and contraction. And Thermalloy feed ends have lasted up to *10 times as long* as "bricked-up" ends.

With the many different designs of Thermalloy feed pipes and feed ends available, an Electro-Alloys engineer can help you choose the type best adapted to your requirements—for easiest installation and maximum service life

Call your nearest Electro-Alloys office, or write Electro-Alloys Division, 2144 Taylor St., Elyria, Ohio.

*Reg. U. S. Pat. Off.

**Specify THERMALLOY* for heat and abrasion resistance ... CHEMALLOY* for corrosion resistance**

AMERICAN Brake Shoe COMPANY

**ELECTRO-ALLOYS DIVISION**
ELYRIA, OHIO

# For the HOTTEST ZONES in your kilns


## a NEW Harbison-Walker Refractory

THERMAG is a hard-fired spinel-bonded magnesite-chrome brick which represents a distinct class of basic refractories. It possesses to an exceptionally high degree the physical properties needed for long service under the most severe operating conditions in the high temperature zones of rotary kilns. In THERMAG are combined the properties of high strength throughout the temperature gradient through the lining and the right chemical composition to acquire and firmly hold protective clinker coatings.

THERMAG has now been in service in more than fifty cement kilns over a period of several years. The service records prove it to be the outstanding refractory for the most severe conditions.

**Harbison-Walker Refractories Company**
AND SUBSIDIARIES

# 25 Years of service TO THE CEMENT INDUSTRY 1926-1951

Central control board, Fuller-Kinyon System.

When Fuller Company was organized in 1926, the entire personnel numbered only twenty-two. In the ensuing quarter century, constant research and engineering development have enabled Fuller to grow and expand, until the company now operates two manufacturing plants and has a personnel of approximately 800.

Originally, Fuller offered the Portland Cement Industry only the Fuller-Kinyon Conveying System. This conveying system has had the widest possible acceptance by the cement industry—today more than 96 percent of the cement plants in the country use it for conveying finished cement, and many for conveying cement raw materials, pulverized coal, and flue dust.

But Fuller—through close contact with the cement industry—has kept abreast of its progress. As new and improved processes were developed for the manufacture of Portland cement, Fuller designed and built new and improved equipment for its handling. Today, Fuller equipment and systems are helping in the production of better products at lower costs—are meeting and even anticipating the needs of the Portland cement industry, thanks in no small measure to the close cooperation and helpfulness of members of the cement industry.

Manheim, Pa. Plant.

Catasauqua, Pa. Plant.

**Fuller**

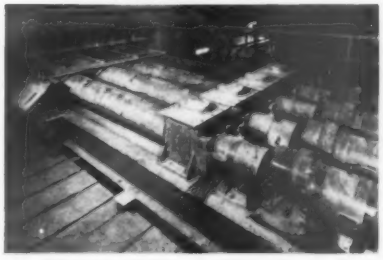
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

G-58T

Fuller-Kinyon Pumps, conveying finished cement.

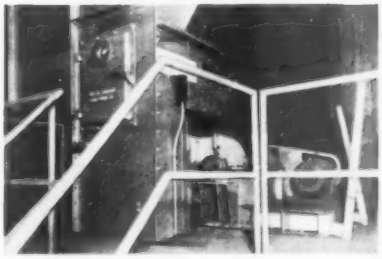
Two Fuller Inclined-Grate Coolers, capacity each 5000 bbl./24 hrs.

Fuller Dry Pulverized-Material Coolers, cooling finished cement.



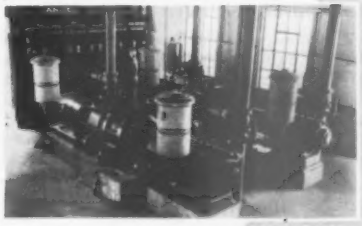
F-H Airslide Conveyor, transporting cement raw materials from elevator to storage bin.

Fuller Clinker Breaker.



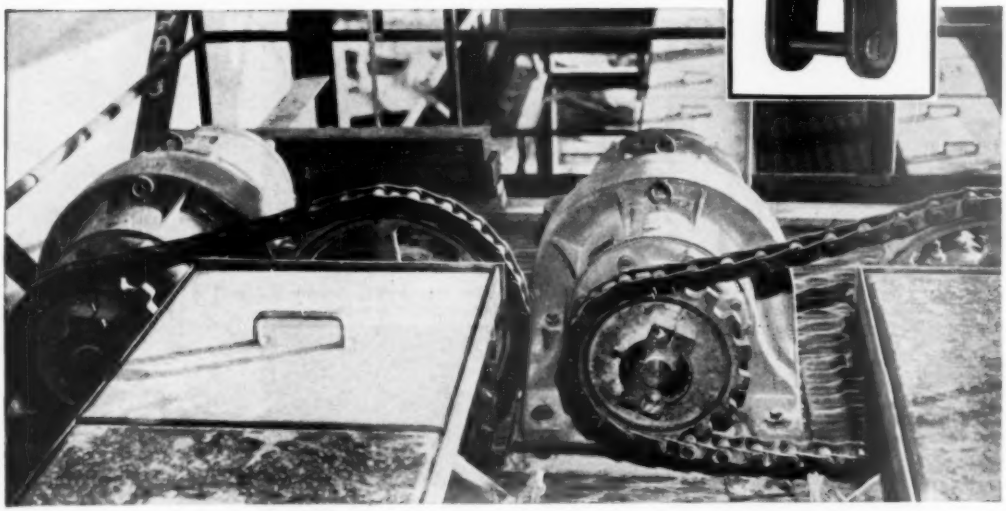
Rotary Discharge Valves underneath cement storage silos.

Two Fuller Rotary Duplex Single-stage Compressors, capacity each 2040 c.f.m., 40-lb. pressure.



FULLER COMPANY, Catasauqua, Pa. • 120 S. LaSalle St., Chicago 3 • 420 Chancery Bldg., San Francisco 4

# GET MORE HORSEPOWER PER CHAIN DOLLAR



Rex Chabelco® Steel Chain is ideal for conveyor and bucket elevator drive service in pits, quarries and cement plants. Since these drives operate under heavy loads at low to moderate speeds, Rex Chabelco delivers more horsepower for each dollar of investment. Here's why:

First, for equivalent load, Rex Chabelco Chains and Sprockets are lower in original cost than other types of driving medium. Often a single strand Chabelco Chain will handle loads that require multiple strands in other types of drives.

Second, Rex Chabelco is lowest in overall operating cost and assures long overall drive life. It is a precision-built chain made of high carbon or alloy steel, heat treated for high strength and durability. Clearances are built in between chain parts, permitting exposed operation under severe conditions. Dust and dirt are far less likely to build up between chain parts and cause "freeze-ups." Heavy shock loads are easily accommodated. Maintenance is simpler . . . more economical.

Rex Chabelco Chains come in a wide variety of sizes and strengths. They are frequently used to replace cast chains of equivalent size where greater strength is necessary. They can often operate over the same sprockets as equivalent size cast chain.

Rex Chabelco Chain Drives are *easy* to select. For information, ask your local Rex Field Sales Engineer, or write to Chain Belt Company, 1649 W. Bruce Street, Milwaukee 4, Wisconsin.

**Other Rex Favorites for Pit, Quarry and Cement Mill Service**

Rex Durobar® Combination Chain

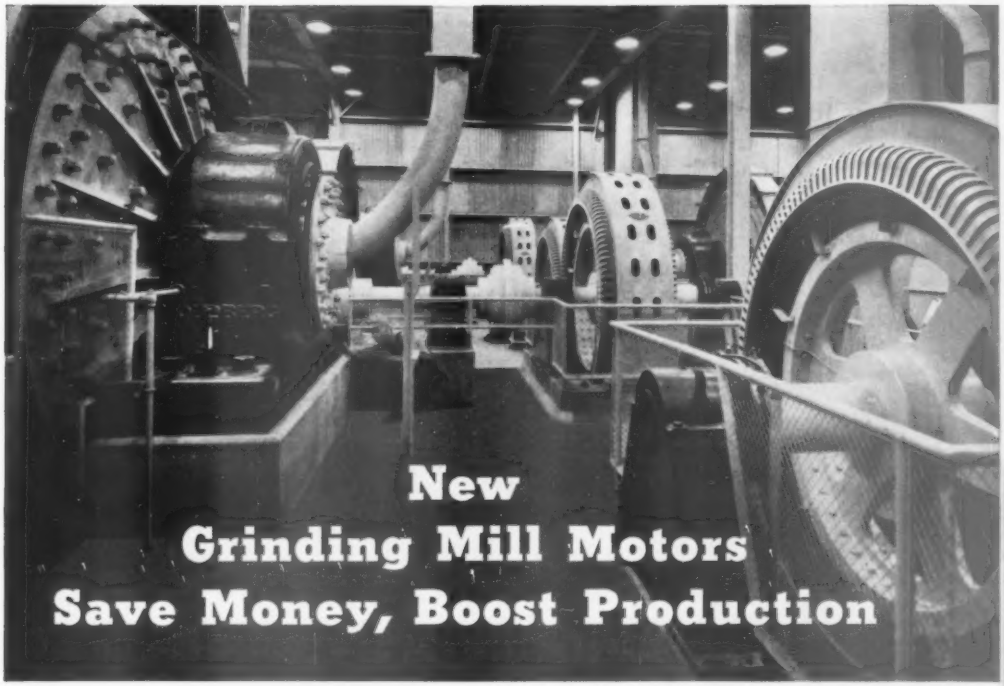
Rex Ley-Bushed Chain

Rex Style "A" Bucket

Baldwin-Rex® Roller Chain

CHAIN BELT REX COMPANY ®

CHAINS AND SPROCKETS



# New Grinding Mill Motors Save Money, Boost Production

## E-M Designs Electric Drives and Controls for new, completely modern Missouri Portland Cement Co. plant

Important goals of increased cement production and lower operating costs are now realities in the new Missouri Portland Cement Company plant at St. Louis.

As you know, purchased power cost is a sizeable item in cement manufacture. In this new plant's grinding mills, a substantial increase in drive power efficiency is helping to slash this cost.

Six E-M high torque Synchronous Motors are direct-connected to the grinding mills, doing both raw and finish grinding. These 180 rpm, 2300 volt motors operate at unity power factor, requiring no magnetizing current from the power line and providing the highest attainable running efficiency.

Since grinding at Missouri Portland is a heavy duty operation, E-M engineers built heavy duty mill-type construction into the motors . . . extra heavy motor frame, dust-resistant coil finish, cool-running sleeve-type bearings, and high thermal capacity cage windings for starting under full load in coldest temperatures.

Safety has been built in, too. E-M Hi-Fuse (high voltage, high interrupting capacity) Controls include protection against short-circuits, protection for motors against abnormal operating conditions, safe, complete segregation of high voltage and low voltage circuits, and total panel enclosure of all control parts.

Consider these E-M advantages for your own drive problems. Your nearest E-M engineer can advise you, or write the factory for Publication No. 175. Modern E-M drive power can help cut *your* costs, too.

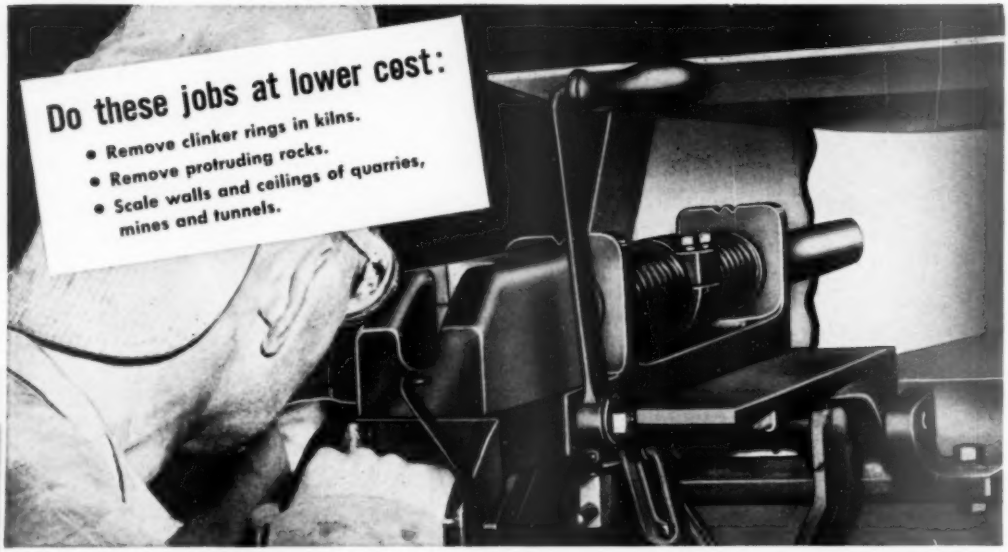
**ELECTRIC MACHINERY MFG. COMPANY**
MINNEAPOLIS 13, MINNESOTA

**E-M "INCHER" CONTROL SYSTEM**
Spots Mills Quickly and Safely

All you do is push a button, and this E-M-developed Control turns the grinding mills literally inch-by-inch into proper position. No more costly, time-consuming, unsafe mechanical spotting. With this E-M Incher Control built into the switchboard, any Synchronous motor can be spotted quickly, safely, and easily.

SPECIALISTS IN
**DEPENDABLE DRIVE POWER**

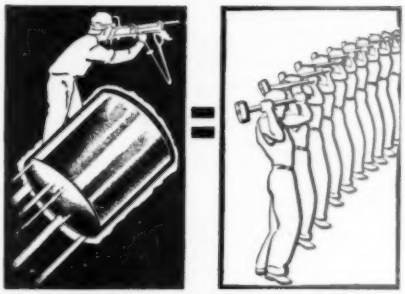
1200-TPA-2111



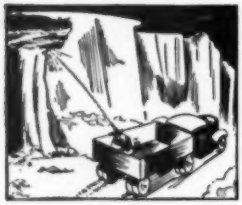

# The Remington Industrial Gun will save you time and money!

Especially designed for the cement and mining industries . . . the new Remington Industrial Gun eliminates old-fashioned sledge-hammer methods of "barring out" clinker rings! One man operates it . . . firing a few well-placed shots that loosen the clinker ring and cause it to crumble when the kiln is rotated. There's no need to shut down the kiln and consume time cooling and reheating it.

For folder giving further information, write to Remington Arms Company, Inc., Bridgeport 2, Conn.



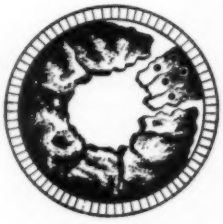
**ONE MAN . . . OR MANY?** The Remington Industrial Gun makes it possible for one man to destroy heavy obstructions that formerly required the time of several men with hand tools, working in restricted or hazardous positions.



**The Remington Industrial Gun Has Many Uses**

It's handy for scaling the ceilings and walls in mines. The illustration shows how the gun can be used to remove protruding rocks, ice and other obstructions at inaccessible points where conditions permit this kind of operation.

**Remington Industrial Guns are leased—$200.00 the first year, $25.00 per year thereafter.**



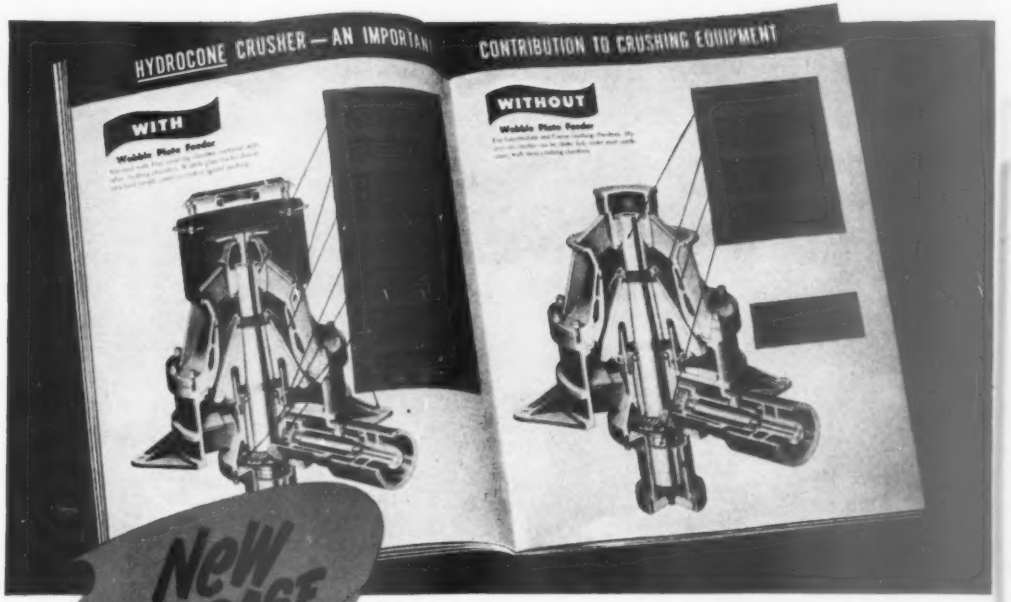
**Cutting a "key way."** A few well-placed shots will loosen a section of clinker . . . weaken the rest of the ring . . . usually cause it to fall when kiln is rotated.

**Remington Industrial Shells** are loaded with a powerful 3-ounce lead projectile that develops 7475 foot-pounds muzzle energy.

*"If It's Remington—It's Right!"*

Remington DU PONT

# Announcing New HYDROCONE Crusher Handbook!




**NEW 32-PAGE BOOK...** ***Contains Data on HYDROCONE Crusher Operation, Application, Engineering***

FOR YOUR BENEFIT, the facts you'll want to know about the *Hydrocone* crusher have been organized in this convenient handbook, containing drawings, cut-away views, graphs, tables, photographs.

It explains why the *Hydrocone* crusher's hydraulic operation is such a big improvement over conventional secondary or tertiary gyratory crushers. It illustrates the *Speed-Set* control, for fast, accurate product size adjustment. It shows how Automatic Reset gives you protection against uncrushable materials.

And — this new booklet contains valuable information for your engineering file! Send for your copy today. Allis-Chalmers, Milwaukee 1, Wis.

*Hydrocone and Speed-Set are Allis-Chalmers trademarks.*


ALLIS-CHALMERS
Milwaukee 1, Wis.
Please send my copy of *Hydrocone* Crusher Bulletin 07B7145B

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Company

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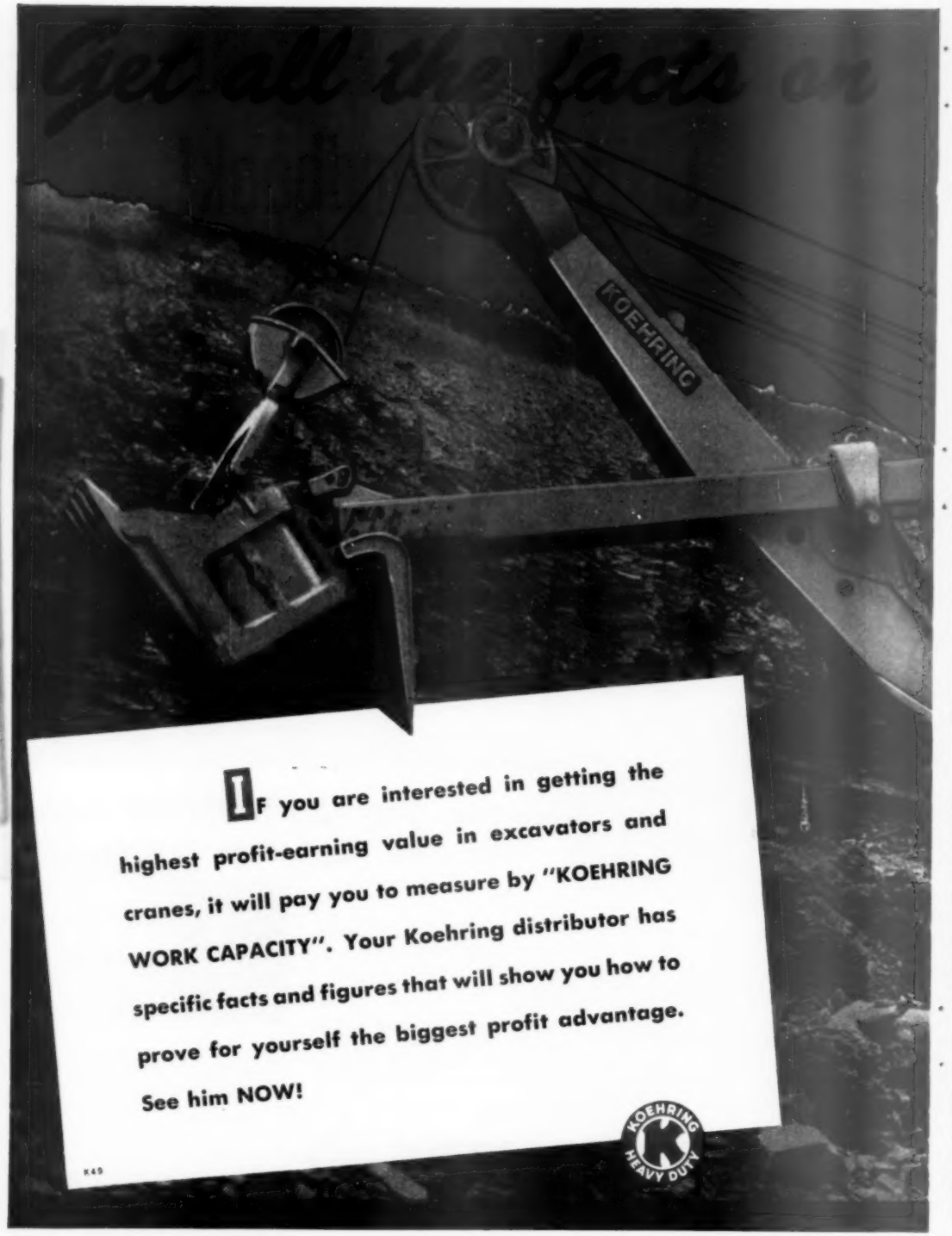
**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**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See him NOW!
K49
KOEHRING
HEAVY DUTY

# Barber-

## BUCKET LOADER . . .

MODEL 543

**SAVES** man power-truck time-money

**LOADS** all free-flowing materials at 3 yrds. per minute

Cost studies prove that nothing can compete with a Bucket Loader in lowest cost loading from stock piles to trucks.

The B-G constant flow principle virtually eliminates the human element — guarantees the same hourly production all day long, whether the operator is fresh or tired out.

The new Barber-Greene Model 543 is the last word in loading economy. Backed by over a billion cubic yards handled by its predecessors, this machine is ready to cut your loading costs.

The new hydraulically controlled trimmer-conveyor combines with time-proved B-G advantages — such as the Spiral Feed, Cleanup Scraper, automatic Overload Release and Floating Boom — to save appreciable manpower on every job. With its 15 m.p.h. road speed, the 543 can get to the job fast and move from pile to pile in a hurry. It is built for high production through years of low-cost service. In addition, it is convertible to a Snow Loader for year-round usefulness.

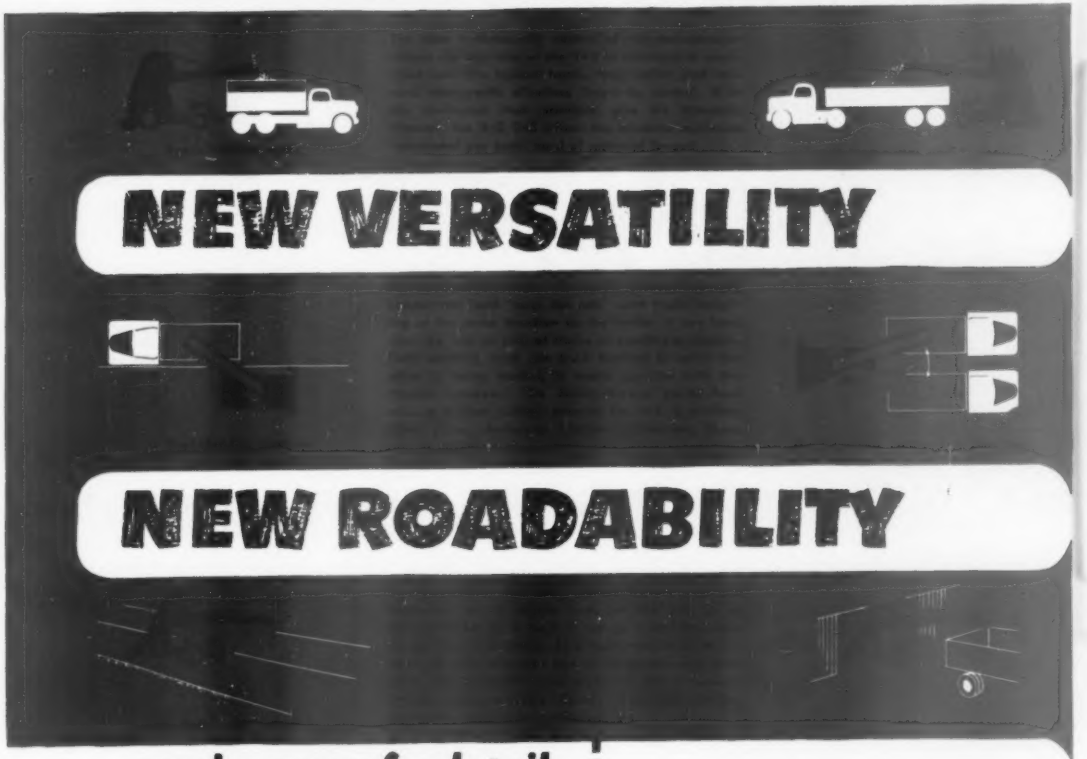
***see your BG distributor***

# Greene

## for lowest cost per yard-in-truck

**THE ONLY LOADER WITH TIME-SAVING**

# HYDRAULIC TRIMMER




## send coupon for details

Today, with manpower and truck time becoming more and more costly, the B-G 543 Loader offers you a proved way to save money while speeding up your loading operations. Use this coupon to get full information and start planning for the day when you'll have a Model 543 cutting your costs.

**BARBER-GREENE COMPANY**

AURORA, ILLINOIS, U.S.A.

**BARBER-GREENE COMPANY** 194
**AURORA, ILLINOIS**

Send bulletin on the 543 Loader. ☐

Please have representative call. ☐

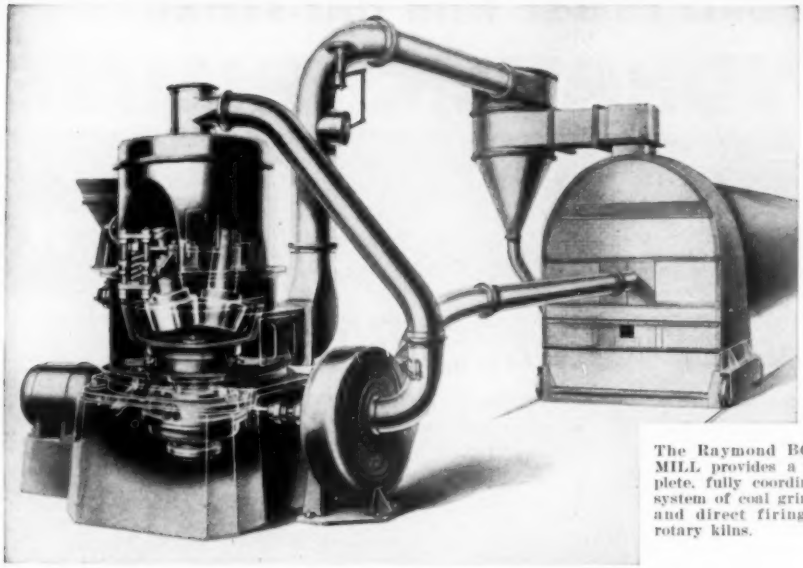
Name .....

Firm Name .....

Address .....

City ..... State .....

# HOW BOWL MILL FIRING



The Raymond BOWL MILL provides a complete, fully coordinated system of coal grinding and direct firing for rotary kilns.

## 264 UNITS SINCE 1935 (For Kiln Firing Alone)

THE outstanding success of the RAYMOND BOWL MILL is measured by the steadily increasing number of these modern direct-firing units installed each year in the Cement, Lime, Burned Dolomite, and similar fields, pulverizing coal for firing rotary kilns.

The graphic record on the opposite page tells the story. From the first three units installed in 1935, the number of Bowl Mills in operation has grown to 264 units installed up to January, 1951. These mills have a total rated capacity of approximately two-and-one-half million pounds of coal per hour, for firing rotary kilns alone.

Raymond leadership is based on dependable performance, year after year, and is maintained by the proved ability of the Bowl Mill to reduce over-all costs and insure top efficiency in kiln operation.

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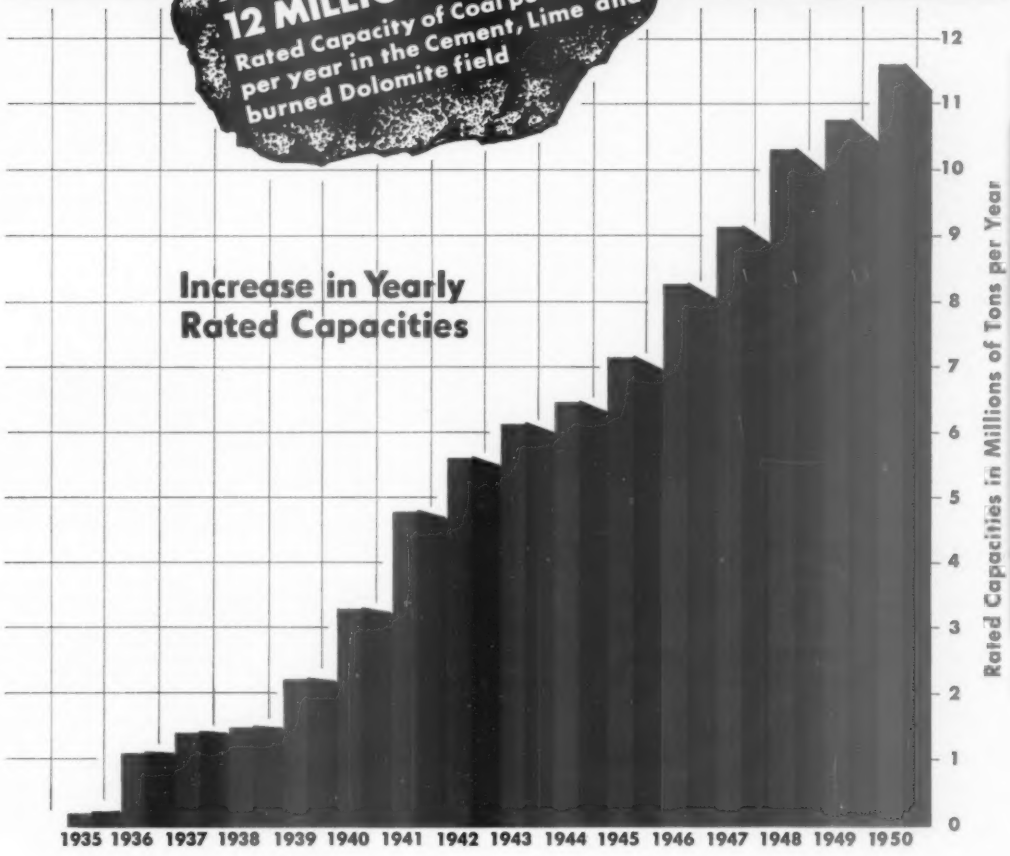
**ALMOST . . .**
**12 MILLION TONS**
Rated Capacity of Coal pulverized per year in the Cement, Lime and burned Dolomite field




GROWTH OF BOWL MILL FIRING BY YEARS

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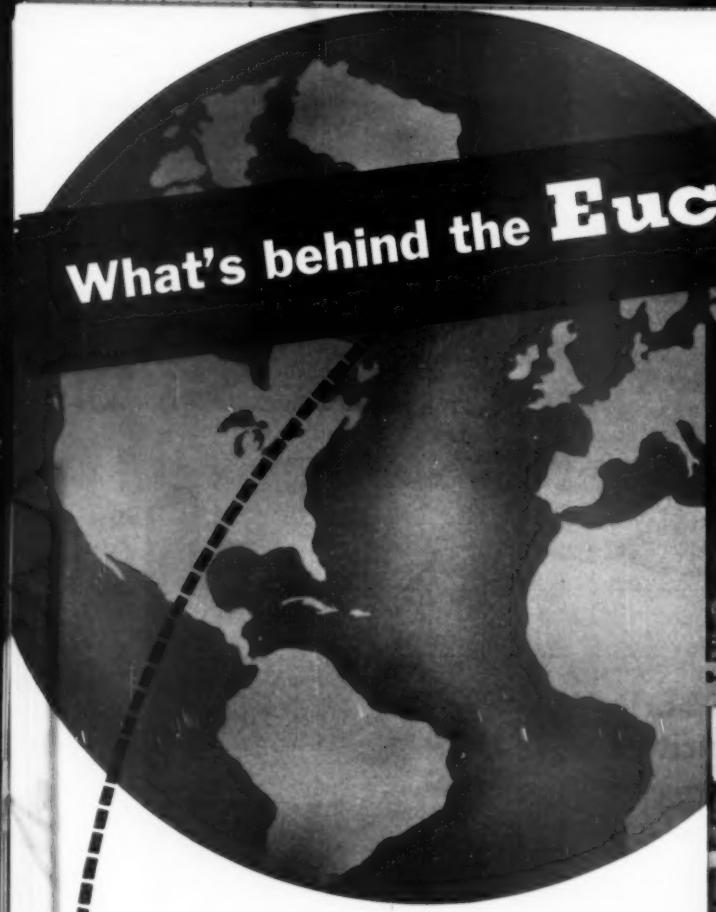

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EUCLIDS

★ ★ ★ Editor's Page

## Modern Cement Mills Set a New Pattern for Production

NEW PORTLAND CEMENT mills and those that have practically been rebuilt in the last several years are in sharp contrast to the older plants in many respects. They continue to manufacture cement using the same major types of equipment, but are demonstrating that there always have been deficiencies in the operation of machinery, and in balancing the separate mill functions with other departments for optimum overall efficiency, which could be eliminated. It is possible for a new plant to take full advantage of up-to-date technical advances, which is denied the majority of mills which by necessity must rebuild piecemeal.

Mills like the brand new operation of Lone Star Cement Corp. near Roanoke, Va., described in this issue, deserve close study since the design reflects the latest advances in engineering, all integrated into a single mill. Each department has been designed with a view to best operation of the others, and the layout was selected that would permit low-cost material handling in achieving the lowest possible unit cost of cement.

One thing that stands out over all other considerations, in a new plant like Lone Star's, is that nothing has been spared to make the plant an agreeable place in which to work. The plant is an attractive institution, with plenty of floor- and head-room, and it is well-lighted, bright and clean. Its eighteen dust collectors and the stress on good housekeeping make it the most dust-free plant in the industry.

Plants such as this, and other new ones of recent date, are designed for high efficiency of men as well as machinery. Much of the drudgery is being taken out of duties that have always been distasteful around a cement mill. Many of the back-breaking jobs have given way to equipment, including the palletized handling of refractories, cement sacks and other supplies. Passenger elevators eliminate the stair climbing to high places, and freight-type elevators, power lift trucks and overhead cranes handle heavy repair parts and supplies. Kiln hoods and even the tops of mechanical air separators are being insulated to hold down the temperatures in working areas.

### Worker Consideration

Providing labor saving devices and an atmosphere to make jobs in the mill pleasant are the keystones to good employe relations and are vital to the building of favorable community relations which are so necessary in American industry today. A sincere desire to make jobs pleasant, as demonstrated by large capital investment specifically for that purpose, will lead to improved production per man-hour and attract good workers who will want to stay with the plant. With the rapid technical advances in the manufacture of portland cement through more refinements, automatic controls and instrumentation, it is essential that more jobs in the industry be sought by the better class of workers. The only reason why progress has been slow in the adoption of many refinements in production available to the industry has been lack of ability of the workers to operate modern and sometimes scientific equipment.

The newer plants are emphasizing economy in material handling as the key to low-cost operation and, apparently, there is a decided trend toward centralized storage for raw materials and clinker for ready transfer to processing machinery. A mill layout with the kilns forming one leg of an L pattern, and a covered storage area adjoining a single mill department at right angles, seems to be gaining in favor. This makes for compactness and efficient handling; it also permits maximum utilization of manpower. Material flow has figured importantly in new plant design with emphasis on controlled feed into kilns and mills and control of sizes of feed into grinding mills.

### What About Marketing?

Building and rehabilitation to achieve low unit production costs, through the economies of efficient large-scale production, are the very heart of competition, and permit passing on savings to the consumer. The cement industry has done admirably well in this respect compared with other industries. However, the incentive to continue requires that costs of distribution to the consumer likewise be held within bounds or all the benefits from low-cost production will mean nothing when the day of the buyers' market comes.

Unless Congress rules favorably on bills S.719 and HR2820 now pending, which would clear up the confusion over the meanings of the various laws and decisions concerning pricing and make the absorption of freight in good faith to meet competition constitute a defense against charges of price discrimination, the consumer of cement cannot benefit as he should from economical cement mill operation. However efficient a plant may be, its marketing operations will be restricted within narrow limits.

Bror Nordberg

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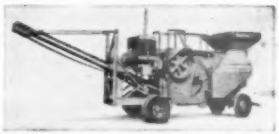

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# Rocky's NOTES

Nathan C. Rockwood

## Water — Thermally Incompatible Aggregate

WHEN IT WAS SUGGESTED that retained water probably was the real factor in thermal stresses in concrete (May issue, ROCK PRODUCTS, p. 99) we had not read the article by S. L. Meyers, on another page. Study of Mr. Meyers' article confirms belief that it is primarily "gel water" (pore water) rather than thermal characteristics of minerals that causes volume changes attributed to thermal incompatibility of aggregates.

We also know now of some laboratory research on concrete and mortar containing an integral waterproofing or water-repellent material. Such a material, of course, tends to keep water out of the very fine pores and capillaries, and early results tend to show that this makes a more resistant concrete. Possibly the water repellent properties of air-entraining agents are factors in their ability to make more durable concrete.

Mr. Meyers is a well known, careful, thorough researcher; his previous publications are widely quoted. His problem in this instance is to differentiate between expansion and contraction of concrete caused by temperature changes, and volume changes caused by differences in moisture content which always attend heating or drying. As ordinarily conducted, tests and field investigations give the combined result rather than effect of either alone. It is unfortunate Mr. Meyers, or some one else, has not conducted the same kind of investigation on aggregates by themselves, as well as when incorporated in concrete or mortar, for if moisture content is a primary factor in the amount of thermal changes of cement paste and concrete, the same kind of pore or cell water in aggregate must similarly influence its coefficient of thermal expansion. If this is the case, it may be possible to so pre-treat them as to make an entirely satisfactory concrete aggregate for some purposes.

That kind of study is important because Mr. Meyers reasons, as have others, that because both cement paste and aggregates contribute to thermal properties of concrete, and there is approximately three times as much aggregate as cement paste, the effect of aggregates is three times as great. We doubt that can be proved, unless we consider aggregates that have much the same kind of pore or gel-pore characteristics as cement paste. This might be so with some cherts or very fine grained or argillaceous limestones.

### Cement Paste Peculiarities

Mr. Meyers quotes T. C. Powers to the effect that the apparent thermal coefficient of expansion of hardened cement paste is made up of two movements, the true kinetic thermal movement plus a movement due to "swelling pressures." What causes "swelling pressure"? Presumably, water absorbed or adsorbed by hardened paste or gel can not do more than occupy the voids, or pore space. There is such a thing as heat of adsorption, just as there is heat of solution. Isn't it possible that "swelling pressure" may be caused by an increase in volume of trapped water in the cells because of temperature change? Mr. Meyers says there is a reduction of potential swelling pressure with age, which he interprets to mean that the gel is slowly converted to a microcrystalline or crystalline material, with corresponding reduction in specific surface (that is, reduction in porosity, or increase in size of pores).

There are two ways by which gel water can be gotten rid of. One is by evaporation or drying out; the other by combination of water or its elements in the crystal of some mineral that may be formed. In either case the distinctive kind of porosity in the original gel would be changed to something else. Any method by which gel water or pore water can be reduced or eliminated is therefore advantageous.

### Effect of Relative Humidity

Mr. Meyers found that the thermal coefficient of hardened cement paste is a maximum when the relative humidity is about 70 percent. It is a minimum when the paste is water-saturated, and when it is very dry. One may reason that if it is volume change in contained water that provides the biggest factor in the thermal coefficient, saturated paste should have the highest coefficient. That is not necessarily so. The "swelling pressure" may come from water trapped in gel cells or pores. When hardened paste is saturated there are probably more or less open channels to the surface so that interior pressure may be somewhat relieved and expansion arrested. But there comes a time when water in the smallest capillaries, and interior pressure back of it, can no longer find an easy outlet. This apparently occurs when the relative humidity is about 70 percent. Prof. Lewis, in the July issue, discussing ideas expressed in our May article, said the mobility of absorbed water in the pores of concrete is an advantage; that this water will find its way out the same way it got in. But does it? A quick change in temperature may build up interior pressure faster than slow flow through tortuous minute capillaries can relieve it.

### Relief of Breaking Stresses

Mr. Meyers' paper discusses various ways stresses built up by thermal changes may be relieved. The prime factor involved in saving concrete from cracking and disintegration is it's *extensibility*. That is ability to adjust interior structure without losing its integrity. Practically all materials have some capacity to flow or creep under continuous stress or sustained loading, and concrete is no exception. But flowability of hardened concrete is a function of its elasticity, or better, resiliency. It is, of course, the opposite of brittleness, which is distinguished by a high modulus of elasticity, but little elasticity.

As every one knows, progress in portland cement manufacture has been to produce cement that makes *strong* concrete — unyielding concrete that sustains high compressive stresses; has a high modulus of elasticity. That may be the answer for many structural purposes, such as building frames, not subjected to sudden changes of temperature and humidity, where maximum strength and rigidity for least bulk is highly desirable. Does it hold true for a pavement or a dam, where it is difficult to get rid of retained water?

Probably it is because portland-natural-cement blends, and portland-slag-cement blends, make more resilient or elastic concrete that it resists disintegration better. The theme of the moment is that all good concrete may be accounted for by air entrainment, accidental or by design. The lasting properties of the famous 60-year old Bellefontaine, Ohio, pavement are now attributed to accidental air entrainment. The cement used in it was made by briquetting clay and marl, burning these bricks in a dome kiln, and grinding to not finer than 75 percent through a 100 mesh. If air entrainment will do so much for cement such as that, it seems cement manufacturers are wasting a powerful lot of energy today.

# LABOR RELATIONS TRENDS

## U. S. Supreme Court Defines Primary and Secondary Strikes and Boycotts

By NATHAN C. ROCKWOOD

WE HAVE KEPT OUR READERS posted from time to time on the case of the Denver Building and Construction Trades Council (A. F. of L.) and two local contractors, one of whom was compelled to cease doing business with the other because the latter employed nonunion labor. Our first reference to it was in the April, 1948, issue, which described how the regional director of the National Labor Relations Board petitioned the U. S. District Court at Denver for a temporary injunction to prevent the centrally organized building trades unions from picketing a local construction job. The District Court's decision was given in our issue of June, 1948.

The case is of very general interest to our readers because it was a typical attempt of the building trades unions to prevent a construction contractor from doing business with another business organization whose employes had no desire to become union members, and whose employer refused to be a party to compelling them to join. The Building Trades Council, after using, unsuccesafully, persuasion and threats, established a picket line on the job, which action ended in the union members of the general contractor and of other subcontractors refusing to do any more work until the general contractor cancelled the contract with this nonunion subcontractor.

The N.L.R.B. could hardly do otherwise than decide that this was a secondary boycott prohibited by the Taft-Hartley Act. However, the U. S. District Court at Denver decided that the construction of a commercial building in the city did not "affect" interstate commerce within the meaning of the law, and consequently the case did not come within the jurisdiction of the N.L.R.B. The Board then went to the U. S. Circuit Court of Appeals of the District of Columbia, which decided that the case did affect interstate commerce and that the N.L.R.B. did have jurisdiction. However, this Court also ruled that the picketing and resultant walkout of the union members was a *primary strike* and *not a secondary boycott*, and therefore did not violate the Section 8(b)(4)(A) of the Taft-Hartley Act. The salient points of this decision were published in our issue of November, 1950, page 41.

### Supreme Court Decision

Along with two other similar cases, in which there were conflicting lower court decisions, the Denver case went to the Supreme Court on an appeal by the N.L.R.B. The decisions on all the cases were handed down June 4, and considerable confusion has been cleared up. This decision upholds the ruling of the Board on all points, and the case is remanded to the lower Court of Appeals, whose decision is reversed, for procedure "not inconsistent" with the Supreme Court's present finding.

Although the electrical subcontractor had expended only about $315 for labor and about $350 for materials before he was forced off the job, the Supreme Court held that the N.L.R.B. was justified in its finding that it had jurisdiction. Even though the subcontractor did no work outside the state, he did use materials from outside. The Court also said that the Board sometimes did refuse rightly to take jurisdiction in local disputes, but that "the maxim *de minimis non curat lex* (the law does not concern itself with trifles) does not require the Board to refuse to take jurisdiction of the instant case."

The points at issue were (1) the object of the strike, to determine whether it was a legitimate primary strike or an unlawful secondary boycott, and (2) whether the peaceful picketing by the union members was, as they claimed, within their rights under the "freedom of speech" clause of the Constitution. In the determination of the first point the Court went back to the committee reports when the Taft-Hartley Act was before Congress to find out what was in the minds of the authors and advocates of the law.

Part of the text of the Supreme Court decision on (1) the object of the strike reads as follows: "In the background of the instant case there was a long-standing labor dispute between the Building Trades Council and Gould and Preisner [the subcontractor] due to the latter's practice of employing nonunion workmen on construction jobs in Denver. The respondent labor organizations contend that they engaged in a primary dispute with Doose and Lintner [the general contractors] alone, and that they sought simply to force Doose and Lintner to make the project an all-union job. If there had been no contract between Doose and Lintner and Gould and Preisner there might be substance in their contention that the dispute involved no boycott. If for example, Doose and Lintner had been doing all the electrical work on this project through its own nonunion employes, it could have replaced them with union men and thus disposed of the dispute. However, the existence of the Gould and Preisner subcontract presented a materially different situation. The non-union employes were employes of Gould and Preisner. The only way the respondents [the Building Trades Council] could attain their purpose was to force Gould and Preisner itself off the job. This, in turn, could be done only through Doose and Lintner's termination of Gould and Preisner's subcontract. The result is that the Council's members' strike, in order to attain its ultimate purpose, must have included among its objects that of forcing Doose and Lintner to terminate that subcontract. The Court accepted "this crucial finding" of the N.L.R.B., and held a strike with such an object as an unfair labor practice.

The Court said further: "It is not necessary to find that the sole object of the strike was that of forcing the contractor to terminate the subcontractor's contract. This is emphasized in the legislative history of the section. * * * * We agree with the Board also in its conclusion that the fact that the contractor and subcontractor were engaged on the same construction project, and that the contractor had some supervision over the subcontractor's work, did not eliminate the status of each as an independent contractor or make the employes of one the employes of the other. The business relationship between independent contractors is too well established in the law to be overridden without clear language doing so. The Board found that the relationship between Doose and Lintner and Gould and Preisner was one of 'doing business' and we find no adequate reason for upsetting that conclusion."

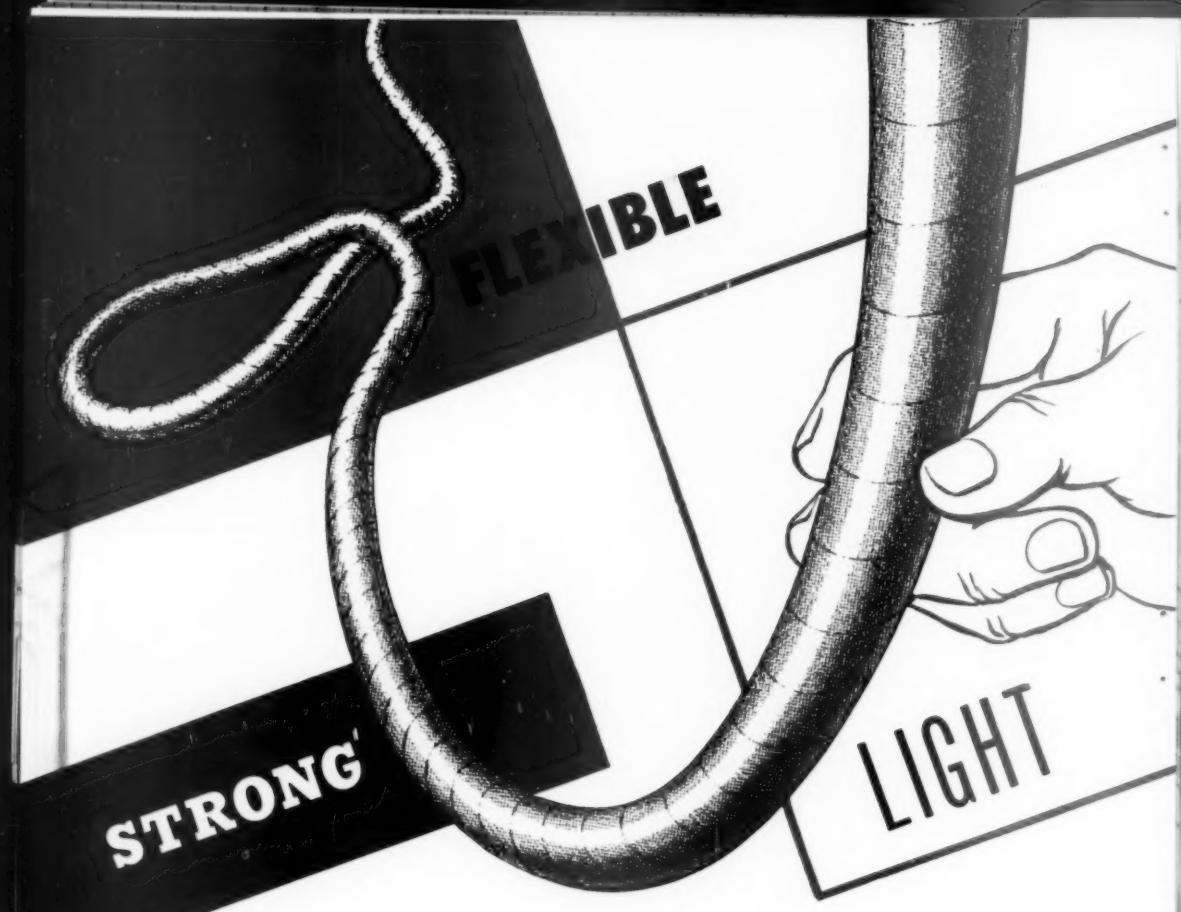
### Freedom of Speech

The labor unions, as always in similar cases, raised the issue of "peaceful picketing" as privileged under the freedom of speech guarantee of the Federal Constitution, and under Section 8(c) of the Taft-Hartley Act. On this point the Supreme Court ruled: "Finally safeguarding freedom of speech has no significant application to the picket-line placard in this case. Section 8(c) [of the Taft-Hartley Act] does not apply to a mere signal by a labor organization to its members, or to the members of its affiliates, to engage in an unfair labor practice such as a strike proscribed by Section 8(b)(4)(A). That the placard was merely such a signal, tantamount to a direction to strike, was found by the Board.

* * *

"The further conclusion that paragraph 8(c) does not immunize action against the specific provisions of Section 8(b)(4)(A) has been announced in other cases. * * * * Not only are the findings of the Board conclusive with respect to questions of fact in this field when supported by substantial evidence on the record as a whole, but the Board's interpretation of the

(Continued on page 180)

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# the *Personal Side* of the news

## Association Assistant

SAMUEL OMASTA has been appointed assistant executive secretary of the National Agricultural Limestone Association, Washington, D. C. He replaces Edward J. Brunenkant, Jr.,

Samuel Omasta

who has resigned to accept another position. Born in Hatfield, Mass., Mr. Omasta graduated from Dartmouth College in 1931, when he became associated with his father and brothers in their joint farming operations. He has been interested in agricultural problems for many years, having served as a farm checker and community committeeman for the Agricultural Adjustment Agency Program in Franklin county, Mass., from 1937 to 1941. He then served for a year on the Massachusetts State A.A.A. Committee where he was responsible for the procurement and distribution of materials furnished under the Agricultural Conservation Program in that state. In 1942, Mr. Omasta transferred to the Department of Agriculture in Washington where he worked in the Northeast Region of the A.A.A. under Robert M. Koch, who left the Department in 1947 to become secretary of the National Agricultural Limestone Association. Just previous to his present appointment, Mr. Omasta served as assistant to Roland Crumpler, administrator of the C.M.S. phase of the A.C.P. Program on a national scale.

## Named Superintendent

J. F. VOELKER has been appointed superintendent of Plant No. 4 of Pennsylvania-Dixie Cement Corp., Nazareth, Penn., to succeed R. A. Loveland, who has resigned to accept a position as works manager for the Halliburton Portland Cement Co., Corpus Christi, Texas. Mr. Voelker joined the company a year ago in the capacity of combustion engineer. Prior to that he was chemical engineer and then assistant to works manager of the Riverside Cement Co. Earlier experience in the industry was with Southwestern Portland Cement Co. at its Victorville plant, where he served successively as analyst, technical assistant, general shift foreman and assistant chief chemist.

## Elected Vice-President

LOUIS C. LERNER of Lerner & Co., Boston, Mass., has been elected vice-president of the Victoria Gypsum Co. Ltd., Little Narrows, N. S., Canada, with headquarters in New York, N. Y.

## Receive Merit Awards

WILLIAM H. KLEIN, vice-president and operating manager of the Lawrence Portland Cement Co., Easton, Penn., received an Award of Merit at the 54th annual meeting of the American Society for Testing Materials in Atlantic City, N. J., for his outstanding service to the Society, particularly for his work on Committee C-1 on Cement. He has been a member of the Society for 40 years. A native of Milwaukee, Wis., Mr. Klein grew up in Kansas City, Mo., and was graduated from the University of Michigan in 1906. He started his career in the cement industry with the Kansas Portland Cement Co., Iola, Kan., now owned by Lehigh Portland Cement Co. From 1911 to 1947 he was associated with the Pennsylvania-Dixie Cement Co. and its predecessor companies, becoming vice-president and general manager. He joined Lawrence Portland Cement Co. four years ago.

William H. Klein

Stanton Walker

Stanton Walker, director of engineering and research for the National Sand and Gravel Association and the National Ready Mixed Concrete Association, Washington, D. C., also received an Award of Merit for his outstanding service to the Society, particularly for his work on Committee C-9 on Concrete and Concrete Aggregates, of which he has been secretary for 15 years. A native of Indiana, Mr. Walker attended the University of Illinois, receiving his B.S. in 1917. He was research engineer for the Portland Cement Association, Chicago, from 1917 to 1926, when he was appointed to his present position. He also directs the Research Foundation of the N. S. & G. A. at the University of Maryland. Mr. Walker has been active in A.S.T.M. work for many years and has served on several technical committees including Committee D-4 on Road and Paving Materials, and C-12 on Mortars for Unit Masonry. A former (1940-1942) and recently appointed director, he served on the Society's Committee on Papers and Publications for six years, and currently is a member of the Washington, D. C., District Council. Mr. Walker is a past-president of the American Concrete Institute; was formerly chairman of the Highway Research Board; and is a member of the American Institute of Mining and Metallurgical Engineers. He has written many technical articles and papers dealing with his field of work.

## P.C.A. Engineer Retires

GEORGE C. BRITTON has retired as Philadelphia district engineer of the Portland Cement Association, Chicago, Ill., and has been succeeded by Robert M. Reindollar, Jr., who has been assistant to the district engineer since 1950. A native of Jefferson County, Penn., Mr. Britton was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1907 with a degree in civil engineering. He joined the staff of the Portland Cement Association as field engineer in the Erie territory in 1927. Three years later he was transferred to Harrisburg, and then to Philadelphia in 1933, where he has served as district engineer and district manager, directing field activities in Pennsylvania, Maryland and Delaware. Among his outstanding activities as district engineer for the P.C.A. was his work with state and national officials in the promotion and development of the Pennsylvania Turnpike.

Mr. Reindollar is a former resident of Baltimore and a graduate of Baltimore Polytechnic Institute and Cornell University where he took his degree in civil engineering. From 1941 to 1946 he served in the United States Air Forces as instructor and combat pilot, with overseas service in the European Theater. He holds the Air Medal with three Oak Leaf Clusters and the Distinguished Flying Cross. After World War II, Mr. Reindollar was airport planning engineer in the international division of Trans World Airlines. He joined the staff of the Portland Cement Association in 1947, and was assigned to Pennsylvania territory. Three years later he was transferred to the Philadelphia office as assistant to the district engineer.

## Board Plant Manager

MILES PRESKITT, formerly superintendent of one of the sheetrock wallboard manufacturing plants for United States Gypsum Co., in Sweetwater, Texas, has been transferred to the Fort Dodge, Iowa, plant as manager of the board plant. L. A. Pursell has been named to succeed him at Sweetwater.

## General Manager

JULIUS J. MORISAK has been appointed general manager of the Temple Ready Mix Concrete Co., Temple, Texas. He was formerly sales manager of the City Lumber Co.

## Works Manager

RUSS A. LOVELAND has resigned as superintendent of Plant No. 4 of the Pennsylvania-Dixie Cement Corp., Nazareth, Penn., to accept a position as works manager for Halliburton Portland Cement Co., Corpus Christi, Texas. Mr. Loveland has had more than 30 years' experience in the cement industry, starting in 1920 as mix chemist at the Hanover, Mont., plant of the Three Forks Portland Cement Co. He left there a few months later to attend the University of Chicago, returning as assistant chemist in 1922, working alternately at the Hanover and Trident, Mont.,

R. A. Loveland

plants. Two years later he became associated with the Clinchfield Portland Cement Co., Clinchfield, Ga., as assistant chemist. Subsequently, he joined the Dewey Portland Cement Co., Kansas City, Mo., serving as plant chemist, plant engineer, chief chemist and research engineer at the Dewey, Okla., and Davenport, Iowa, plants, from 1926 to 1944. Mr. Loveland left there to accept a position as production manager for Cementos Portland Moctezuma, S. A., Cuernavoca, Morelos, Mexico. A year later he joined the Marquette Cement Manufacturing Co. as assistant to the technical director. From 1947 to 1949 he served the Portland Cement Association as research engineer in the manufacturing research section.

## Named a Director

JOSEPH T. ENRIGHT has been elected a director of the Monolith Portland Cement Co., Los Angeles, Calif.

## Association President

A. J. CLARK, Builders Supply, Inc., Pharr, Texas, was elected president of the Texas Concrete Masonry Association at its recent convention in McAllen. Vern Cole, Texas Concrete Works, Waco, was elected vice-president, and C. T. Crowe, Crowe-Gulde Cement Co., Amarillo, was named secretary-treasurer. Principal speakers at the convention were Glenn Barnes, past-president of the National Concrete Masonry Association, and Cedric Willson of the Texas Lightweight Aggregate Co., Dallas.

## Institute President

GERALD R. STARK, of the Texas Vermiculite Co., Austin, has been elected president of the Vermiculite Institute. He succeeds Stanley K. Robinson of F. Hyde Co., Montreal, Canada. J. B. Lyall, of Vermiculite-Northwest, Inc., Spokane, Wash., was elected to the board of directors.

## On Planning Committee

LLOYD N. BEUTHEL, manager of the Sandusky, Ohio, plant of The Kelley Island Lime and Transport Co., Cleveland, Ohio, has been named to the Planning Committee of the second annual Ohio Mineral Industries Conference to be held at Ohio State University, October 5 and 6.

## Sales Manager

ERVIN HAHN has been appointed sales manager of the Atlas Building Products Co., El Paso, Texas. He was formerly sales manager for the Besser Manufacturing Co., Alpena, Mich.

## Warner Changes

CHARLES WARNER, JR., and Robert G. Rauscher were elected vice-presidents of the Warner Co., Philadelphia, Penn., and James E. Hewitt was elected secretary, at the recent meeting of the board of directors. Mr. Warner will continue to serve as treasurer and, in addition, has been elected a member of the executive committee. Mr. Rauscher will continue to serve as comptroller and James Hewitt as credit manager.

Mr. Warner has served the company for almost 27 years, starting as a clerk in the cost department in Wilmington in 1924. He was later appointed chief clerk at the Penn plant and subsequently was elected secretary of the company. During this time he also served as assistant to the president. In 1946, upon the retirement of A. D. Warner, Jr., as treasurer, Charles, Jr., was elected to fill this position.

Mr. Rauscher studied accounting at Wharton School, University of Pennsylvania. While employed as an auditor for Haskins and Sells, two of his accounts were the Charles Warner Co. of Wilmington and the American Lime and Stone Co. of Bellefonte. A. D. Warner, Jr., who, as treasurer, handled all financial matters of the company, was impressed with his ability and offered him the job of comptroller. In 1946 he was elected to the board of directors.

Mr. Hewitt started with the company in 1927 and worked successively in the accounting department and the tabulating department which he supervised from 1930 to 1947. He was elected assistant secretary last September in addition to his duties as credit manager.

## City Attorney

F. E. ROSENDAHL, president of the Concrete Products Corp., Sioux City, Iowa, has been appointed city attorney, succeeding Leo E. Fitzgibbons.

## Association President

HERBERT RUSK, president and general manager of Ready-Mixed Concrete, Inc., Mansfield, Ohio, was elected president of the Ohio Ready Mixed Concrete Association at its annual convention in Cincinnati. He succeeds Charles A. Persons of Elyria, Ohio, retiring president. Claude L. Clark was re-elected secretary.

## Heads D.M.A. Branch

LESLIE M. CASE, who was chief of the mining machinery section of the War Production Board during World War II, has been named head of the Mining Machinery Branch in the Defense Minerals Administration, Washington, D. C. He also serves on the committee to determine the machinery requirements of the mining industry. A native of Minnesota, Mr. Case is a mining engineering graduate of the University of Minnesota. Before being appointed to the Defense Minerals Administration, he was sales engineer and district representative in east Texas and west Louisiana for the Chicago Pneumatic Tool Co. Prior to that, he was a sales engineer for the Kennedy-Van Saun Manufacturing and Engineering Corp.

## Joins Cement Firm

VICTOR W. ANCKAITIS has resigned as city engineer of Easton, Penn., to take charge of the rebuilding of the Jamesville, N. Y., plant of the Alpha Portland Cement Co. Upon completion of the plant, Mr. Anckaitis will become a permanent member of the engineering and operating staff of the company, with headquarters at Easton.

## Heads Masonry Association

MARSHALL E. HARRISON, president of the National Masonry Contractors' Association of America, has been elected president of the newly formed Masonry Contractors' Association of Greater Kansas City, which has become affiliated with the M.C.A.A. Headquarters of the new association are at 1429 Dierks Bldg., Kansas City, Mo. Other officers are Estes Elliott, vice-president; Vincent DiCarle, secretary; William Randall, treasurer; and E. W. Hackett, executive secretary.

## Elected President

R. G. L. HARSTONE has been elected president and managing director of Canada Crushed and Cut Stone, Ltd., and G. W. Ritchie has been named vice-president. D. H. Henderson has been appointed general sales manager. Mr. Harstone is also president of the National Cut Stone, Ltd., and Queenston Quarries, Ltd. Mr. Ritchie is president of the Ritchie Cut Stone Co., Ltd.

Canada Crushed and Cut Stone was recently incorporated to acquire all the assets and undertakings of Canada Crushed Stone, Ltd., Queenston Quarries, Ltd., and National Cut Stone, Ltd., and 98 percent of the common shares of the Ritchie Cut Stone Co. Ltd.

## OBITUARIES

J. STANLEY DOWNS, retired superintendent of the Stockertown, Penn., plant of the Hercules Cement Corp., Philadelphia, Penn., died June 28. He was 74 years old.

ALBERT HARRISON HINKLE, division engineer of The Asphalt Institute, Columbus, Ohio, died June 8. He was 71 years of age. Mr. Hinkle was the senior engineer in years of service on the institute's divisional engineering staff, which he joined in 1939. His long career, following graduation from Ohio State University in 1907, included 44 years of experience in highway development work in various states.

WARREN E. EMLEY, retired chief of the Organic and Fibrous Materials Division of the National Bureau of Standards, died June 5 in New Brunswick, N. J. He was 65 years old. Mr. Emley graduated in 1906 from the University of Michigan and in 1912 received the first graduate degree in chemical engineering granted by that school. He entered government service in 1909 as a junior chemist with the Geological Survey, and a year later was transferred to the Pittsburgh laboratory of the Bureau of Standards. While with the Bureau, Mr. Emley was for many years the leading light in the lime and sand-lime brick industries. He did much original research on these products, and was the inventor of the Emley plasticimeter for measuring the plasticity of lime putty. For a time he was employed by the late William E. Carson, president of the Riverton Lime Co., Riverton, Va., on lime research.

JOHN R. LEINBACH, chief engineer for Lehigh Portland Cement Co., Allentown, Penn., passed away June 19 at the age of 62. He had been associated with the company since 1926. Born in Rossville, Ga., Mr. Leinbach was a graduate of the Georgia School of Technology, class of 1914.

ARNOLD A. HERMES, retired secretary-treasurer of the Kentucky Rock Asphalt Co., Brownsville, Ky., died recently at the age of 71. Mr. Hermes was an organizer of the asphalt company 30 years and retired as secretary-treasurer in 1947, but remained a member of the board of directors.

MARK MORTON, president of the Morton Sand and Gravel Co., and co-founder, vice-president and a director of the Morton Salt Co., until his retirement 20 years ago, died recently at the age of 92.

EDWIN T. VOISARD, former general manager and superintendent of the old Gehres stone quarry in Buffalo, N. Y., died suddenly on June 13.

SEELY B. PATTERSON, president of the Calcite Quarry Corp., Lebanon, Penn., died June 10 after an illness of four months. He was 66 years of age. Mr. Patterson was graduated from Colorado School of Mines with a mining engineer degree, and then spent two years at Columbia University. He had held assistant executive positions with the Anaconda Copper Mining Co. in Montana and the C. and A. Smelter at Douglas, Ariz., and also had been superintendent of Bethlehem Mines Corp. in Cuba. Before joining the quarry company, he had been resident engineer for Midvale Steel and Ordnance Co., Sterlington, N. Y.

CHARLES H. GREENE, former engineer at the Bath, Penn., plant of Keystone Portland Cement Co., Philadelphia, Penn., died May 15, after an illness of a year. He was 67 years of age. Mr. Greene retired from his position with the company about a year ago.

JAMES L. LOWERY, one of the founders of the Lowery Brothers Sand and Gravel Co., which has been in operation in Syracuse, N. Y., for more than 50 years, died April 8 after a short illness.

KURT J. REIF, president of the Ozaukee Sand and Gravel Co., Milwaukee, Wis., died April 16 at the age of 62. Born in Koenigsburg, Germany, Mr. Reif was brought to Muskegon, Mich., by his parents when he was three years old and later went to Milwaukee. He worked for his family's grocery, and was a cashier at the Marshall and Ilsley Bank and operated a bakery shop before he retired in 1945. Two years later he joined the Ozaukee Sand and Gravel Co., of which one of his two sons is at present secretary-treasurer.

W. L. KIMMONS, co-owner of the Statesville Ready Mix Concrete Co., Statesville, N. C., died April 21 following a heart attack. He was 38 years old.

WILLIAM R. COFF, sales and promotion engineer for Hume Pipe of New England, Inc., Swampscott, Mass., passed away of a heart attack recently. He had attended the recent convention of the American Concrete Pipe Association in company with J. A. Dunn, president of the company and a past-president of the association. During the war from 1942 to 1945 Mr. Coff was in charge of Naval facilities at South Boston Navy Yard, Tacoma, Wash., and Stockton, Calif., for the U. S. Navy Bureau of Yards and Docks.

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# INDUSTRY *News*

## Magnesia Plant

BASIC REFRACTORIES, INC., Cleveland, Ohio, has announced the beginning of operations at its new $2,250,000 granular magnesium refractories plant at Gabbs, Nev. The plant has begun production of basic magnesite, a refractory product with a magnesia content of 85 percent. The new installation is located on the site of one of the nation's two largest deposits of magnesite and is expected to relieve the current "pinch" in refractories now being experienced by steel companies.

The company had previously operated open pit mines at Gabbs, from which it shipped magnesite and brucite ore to its Ohio plants. In 1942, utilizing the same deposits, Basic Magnesium, a subsidiary, built a plant for the production of caustic magnesite which was utilized at the magnesium plant it built and operated for the government near Hoover Dam.

## Operating Problems Booklet

NATIONAL CRUSHED STONE ASSOCIATION recently announced the availability of a limited number of copies of the printed transcript of the operating sessions of the National Crushed Stone Association and Agricultural Limestone Institute annual conventions held in Cincinnati, Ohio, during the week of February 7, 1951. The publication contains a fund of practical information on a wide variety of subjects and it is expected to prove most informative and helpful to operating men and machinery and equipment manufacturers. Price of the booklet is $.75 per copy.

## Lime Association Survey

NATIONAL LIME ASSOCIATION recently completed a survey of water plants in the United States which use lime for some aspect of water treatment. The information was obtained from data collected by the U. S. Public Health Service and has been compiled under the title "Inventory of U. S. Water Plants Employing Chemical Treatment."

The tabulation lists all municipalities using some type of chemical treatment for water, except chlorination. The study revealed that there were a number of communities using soda ash or caustic soda for pH control or coagulation with alum, many of which could conceivably be replaced by lime, providing the lime industry wishes to pursue this field aggressively.

The survey also revealed that as of 1945, there were 1434 plants using lime to some extent for water treatment, and tells, in most cases, the function that lime plays—whether it is for softening, coagulation, pH control, etc.

## Safety Achievements

UNIVERSAL ATLAS CEMENT CO. recently announced that two of its plants have been honored for outstanding mine and quarry safety records.

U. S. Bureau of Mines Certificates of Achievement in safety were granted to the No. 3 shale mine and the No. 5 limestone quarry of the Hannibal, Mo., plant, and also to the limestone quarry of the Northampton, Penn., plant. Each of these operations operated without a single lost-time accident for the entire year of 1950.

Both the Hannibal and Northampton plants have been honored for safety achievement in the past by the Portland Cement Association.

## To Study Mineral Sources

UNDER A CONTRACT signed recently in Washington, a 4-man research team from Armour Research Foundation of Illinois Institute of Technology will make a 3-month survey of Latin American countries for determining the advisability of, and possible sites for, a Construction Materials Development and Training Center. The research team, composed of chemical, ceramic and structural engineers, plus a market research specialist, will also study road construction materials and investigate building products and manpower sources. In addition they will indicate what equipment, machinery and materials would be needed for the center.

## Perlite Production

THE PERLITE INSTITUTE recently announced that 1,110,250 4-cu. ft. bags of perlite were produced by member companies during the second quarter of 1951, compared with 481,907 produced in the same quarter of 1950, and 244,803 in 1949. In the first two years of operation, production increased over 400 percent and, according to the new figures, is maintaining a sharp upward incline.

## Lightweight Aggregates Plant

MINERAL PRODUCTS CO. recently announced plans for the construction of a plant on Kansas Highway 32, just west of Kansas City, for the production of aggregate for lightweight block. The new plant is scheduled for completion by late fall. A T-shaped building, approximately 100 x 160 ft., built of corrugated metal, will house two sintering machines which will be connected by a series of conveyor belts to the raw materials storage units and to the crushers and graders located outside.

## Dust Control Program

DIAMOND ALKALI CO. has begun a million-dollar dust-control project at its Painesville, Ohio, operations including the Standard Portland Cement Div. plant. The project is a continuation of a plan started some time ago and calls for a major construction program whereby operations which are the worst offenders "will be engineered one by one to eliminate the nuisance they contribute to the atmosphere."

Under the new project, fly ash will be eliminated from the power plant; the cement plant, millroom and pure calcium operations will be cleaned up; scrubbers erected at the lime reburners; and additional improvements made at the lime house and pulverized coal department.

## Cover Picture

COVER PICTURE on this issue is an aerial photograph of Oregon Portland Cement Co.'s Oswego, Ore., plant. The trees surrounding the plant are native firs and provide considerable shelter to the plant.

On the left is the new 9- x 8- x 9- x 287-ft. kiln which was put in operation during 1947. The row of bins in the upper left are for stone storage. The railroad track on the left is used for hauling limestone for unloading at the crusher located in the upper left corner of the picture. The finished cement storage and packing department are at the lower right. The tank in the lower center is for fuel-oil storage.

A detailed article describing operation of this plant upon completion of the enlargement and improvement program was published in ROCK PRODUCTS, October, 1948, page 96.

## Lime Association Meeting

NATIONAL LIME ASSOCIATION will hold its next operating meeting at Heaton Hall, Stockbridge, Mass., September 10-12, 1951. C. C. Loomis, president, New England Lime Co., will preside at the meeting. This is a closed meeting.

Among the guest speakers will be Herman Lange, president of the German Lime Manufacturers Association who will talk on "Current German Lime Production and New Developments." Mr. Lange is president of one of the largest German lime companies and will be accompanied to the meeting by about six other prominent German lime manufacturers. There have been some recent developments in German kiln designs as well as methods of testing lime which are different from standard A.S.T.M. test methods, which will be divulged at this meeting. This is the first time in about 20 years that there has been any direct contact between the American and German lime industries.

John Andrews, The Kelley Island Lime and Transport Co., Cleveland, Ohio, program chairman of National Lime Association meeting at Stockbridge, Mass., September 10-12, 1951

Other topics to be discussed at the meeting are "New Design Down Draft Kiln"; "Rotary Blast Hole Drill" (its comparative cost with other drills); "Fluo-Solids Kiln"; and also, sessions on blasting and general lime burning.

Other features will include a trip through New England Lime Co.'s Adams plant to see the new large-capacity Fluo-Solids kiln in operation; a trip through the same company's Canaan, Conn., plant to see a ferrosilicon magnesium plant in full operation as well as the adjacent lime facilities, and a trip through Lee Lime Corp.'s rotary kiln plant, featuring the Kennedy-Van Saun preheater, and a blasting exhibition by du Pont engineers. The climax of the meeting will be an afternoon of golf at the Stockbridge Golf Club, followed by an old-fashioned New England clambake that evening.

## Portland Cement Production

THE PORTLAND CEMENT industry produced 20,184,000 bbl. of finished cement in April, 1951, and 21,925,000 bbl. in May, 1951, as reported to the Bureau of Mines. This was an increase of 11 percent for April and 10 percent for May, compared with the output in the corresponding months of 1950. Mill shipments in April totaled 20,953,000 bbl., or 14 percent over the April, 1950, figure, while stocks were 2 percent below the total for the same month in 1950. May shipments of 24,894,000 bbl. were 9 percent higher than in the same month of 1950, while stocks were 3 percent less than at the same time last year. Clinker production amounted to 20,420,000 bbl. in April and 21,341,000 bbl. in May, increases of 13 and 9 percent, respectively, over the same months in 1950. The output of finished cement during April and May, 1951, came from 151 plants located in 36 states and Puerto Rico.

## Limestone Meeting

THE MISSOURI LIMESTONE PRODUCERS ASSOCIATION meeting, held at Columbia, June 11, 1951, was attended by approximately 50 limestone producers. Highlights of the meeting were trips through the university laboratories.

A recent summary of 20,000 soil samples taken from farms all over Missouri showed that 2 percent of the soils in the state were deficient in magnesium. In Lawrence and Dade counties, the deficiency proved to be four times as great as the state average, indicating that deficiencies vary from one locale to another. Southwest, southeast and northeast Missouri were most deficient in this mineral. Northwest Missouri was least deficient.

It was suggested that the magnesium content in stone be evaluated as follows:

Percent $MgCO_3$

5-10—Worthy of mentioning magnesium in publicity.

10-35—Should be termed "magnesium limestone" or "dolomitic limestone."

35 and over—Should be termed "dolomite" or "magnesium stone."

## Coming Conventions

**September 10-12, 1951—**
**National Lime Association, Operating Meeting, Heaton Hall, Stockbridge, Mass.**

**October 1-3, 1951—**
**National Sand and Gravel Association, Board of Directors Meeting, The Greenbrier, White Sulphur Springs, W. Va.**

**National Ready Mixed Concrete Association, Board of Directors Meeting, The Greenbrier, White Sulphur Springs, W. Va.**

**October 8-12, 1951—**
**National Safety Congress and Exposition, The Stevens, Palmer House, Congress, Morrison and La Salle Hotels, Chicago, Ill.**

**October 30-31, 1951—**
**American Concrete Institute, Regional Meeting, Sheraton Hotel, St. Louis, Mo.**

**November 26-27, 1951—**
**National Association of Silo Manufacturers, Annual Convention, Palmer House, Chicago, Ill.**

**November 26- December 1, 1951—**
**Chemical Industries Exposition, 23rd Exposition, Grand Central Palace, New York, N. Y.**

**January 15-17, 1952—**
**National Agricultural Limestone Association, 7th Annual Convention, Hotel Statler, Washington, D. C.**

**February 11-15, 1952—**
**National Sand and Gravel Association, 36th Annual Convention and Exhibit, The Stevens, Chicago, Ill.**

**National Ready Mixed Concrete Association, 22nd Annual Convention and Exhibit, The Stevens, Chicago, Ill.**

**Week of February 17, 1952—**
**National Crushed Stone Association, The Stevens, Chicago, Ill.**

**Agricultural Limestone Institute, The Stevens, Chicago, Ill.**

## Phosphate Development

MONSANTO CHEMICAL CO., St. Louis, Mo., recently announced plans for building a multi-million-dollar elemental phosphorus plant near Soda Springs, Idaho. The plant, scheduled to be in operation late next year, will be built by Morrison-Knudsen Co., Boise, Idaho. About 100 workers will be employed with an annual payroll of $500,000. The plant will mine and process phosphate and convert phosphate rock into elemental phosphorus.

## Asbestos Production

PRODUCTION AND SHIPMENTS of asbestos in the United States were a little lower in 1950 than in 1949, as was reported to the Bureau of Mines. High prices were reflected in a sales value that surpassed all previous records. Chrysotile was produced in Vermont and Arizona, and amphibole sales were reported from California, Georgia, North Carolina and Oregon. Demand was exceptionally strong and imports reached an all-time high, of which Canada was the major supplier. Important contributions, particularly of the strategic grades, were made by Africa. Southern Rhodesia furnished most of the low-iron chrysotile required for certain electrical applications. South Africa supplied all of the amosite and most of the crocidolite (blue asbestos) consumed in the United States.

## Stone Producers' Safety Program

NATIONAL CRUSHED STONE ASSOCIATION is making progress in its accident-prevention program and has adopted a safety program designed somewhat after the Portland Cement Association's program. Beginning with the month of May, 1951, all lost-time injuries are to be reported on uniform report-forms and sent to the administrative director at the Washington office. At the end of each month, a short paragraph will be written concerning each accident reported, and sent to the association members without names or other identification being used. Members finding such hazards or conditions existing at their own plants can thereby take steps to prevent the occurrence of similar accidents.

National Crushed Stone Association has extended an invitation to members of the Agricultural Limestone Institute to participate in this accident-prevention program.

## Study Cement Industry

TWELVE REPRESENTATIVES of French industry, under the technical assistance program of the Economic Cooperation Administration, recently visited leading centers in the U. S. to study American techniques in the cement industry. The cement industry in the U. S. averages one and one-half to two man-hours of work per ton produced, compared with three to four man-hours per ton in France, both countries using similar equipment.

Since the war, France has made extensive efforts to boost cement production in order to cope with increased demands for various construction programs. Output in 1950 climbed to 7,000,000 tons, compared with a 4,000,000-ton pre-war production rate. However, current production is still far below the goal of 13 to 14 million tons set under the Monnet Plan for economic recovery.

The French representatives, in their visits to plants and in their discussions with industry and labor officials in the U. S., are attempting to analyze American production methods and industrial "know-how," and plan to adopt, where possible in the French industry, those factors which they find contribute most to the high level of American productivity.

Shown above are employes and their families attending the annual office party of Huron Portland Cement Co., Detroit, Mich., held at H. Ripley Schemm's (vice-president in charge of operations) Knoll Top Farm near Ann Arbor, Mich.

## White Cement Plant for South America

THE COMPANHIA CONSTRUTORA Capua & Capua of Rio de Janeiro, Brazil, has recently bought from Allis-Chalmers Manufacturing Co., Milwaukee, Wis., complete equipment for the installation of a 100 metric ton per day white cement plant. The new plant will be located in the vicinity of Rio de Janeiro, at a town called Parada Lucas, 13 miles from the center of Rio.

The raw materials, free iron, pure calcite, white kaolin and white sand, will be shipped to the plant site by railway and contract trucks. Dr. Conrado Barsotti, formerly chief chemist of Lone Star Cement Corp. and later technical director of two other mills in Brazil, will be consulting engineer for the new project. The president of the new company is Dr. Julio Capua, one of the leading construction engineers of Brazil.

## Diamond Drill Research

BUREAU OF MINES engineers have recently been conducting tests designed to improve the efficiency of diamond-tipped drills used in the minerals industry to drill through hard rock, copper, iron and other ore deposits.

Copies of the report, the first one issued since the work was begun, "Diamond Orientation in Diamond Bits, Procedures and Preliminary Results," by Albert E. Long, may be obtained from the Publications Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Penn.

## Chemical Industries Exposition

THE 23RD EXPOSITION of Chemical Industries will be held in New York City, November 26-December 1, and all the available exhibit space on the four exposition floors of Grand Central Palace is to be utilized. Advance space reservations and applications have indicated an exceptionally heavy concentration of exhibits this year in the two divisions of chemical materials and processing equipment.

The exposition is under the management of International Exposition Co., New York, N. Y., of which Charles F. Roth, manager of the exposition, is president.

## Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of June and for the first six months of 1951 are listed by the Portland Cement Association as follows:

| | Square Yards Awarded During June 1951 | During first six months 1951 |
|---|---|---|
| Roads | 1,938,824 | 14,149,152 |
| Streets and allays | 2,782,105 | 12,527,031 |
| Airports | 2,841,193 | 7,196,442 |
| Totals | 7,562,122 | 33,872,625 |

# HINTS and HELPS

## PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

### Truss-Type Conveyor Gallery

ON THE FLORIDA-GEORGIA state line where the U. S. Corps of Engineers is building a dam, the aggregates,

Truss and steel towers give added support to conveyor gallery

which are delivered to the construction site by rail, are unloaded to ground storage and reclaimed by a tunnel and belt conveyor. The reclaimed material goes to the batching plant which is located on the opposite side of the highway. To protect motorists using the highway, the engineers have devised an extra truss and steel towers which give additional strength to the conveyor gallery.

For further protection, the section of belt over the highway has an extra screen, or grid, paralleling the belt, to prevent spillage onto the pavement below. The belt is of rayon construction and was supplied by Goodyear Rubber Co. The large diameter ducts, going into the top of the batching plant, convey cold air to the coarse aggregates to cool them before going into the mixers.

### Dislodging Crusher Hang-Ups

A NEW CRUSHED granite plant in the Southeast uses a 30-in. Allis-Chalmers gyratory as the primary crusher, which is served by a fleet of Euclid rear-dump trucks. The two accompanying illustrations show the general layout of the primary crusher,

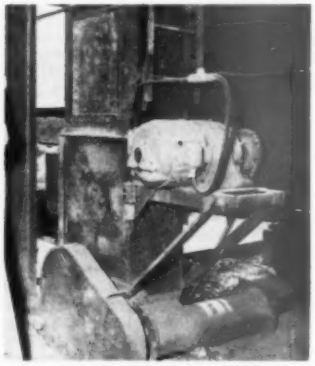
Hook to dislodge rock from primary crusher

with emphasis on the method of dislodging large rock at the throat of the crusher. Two men are required—one is in the control room at left and he operates the electric hoist on the hook. The hook used has steel lugs welded to its concave portion. The handle is of ⅝-in. round steel.

Electric hoist is operated from control room at left

### Double-Duty Gear Motors

THE USE OF GEARED motors has opened up a wide field of usefulness



Geared motor drives bucket elevator which in turn drives screw conveyor under truck hopper

and has permitted the use of mechanical equipment for handling materials by methods quite different from former conventional methods.

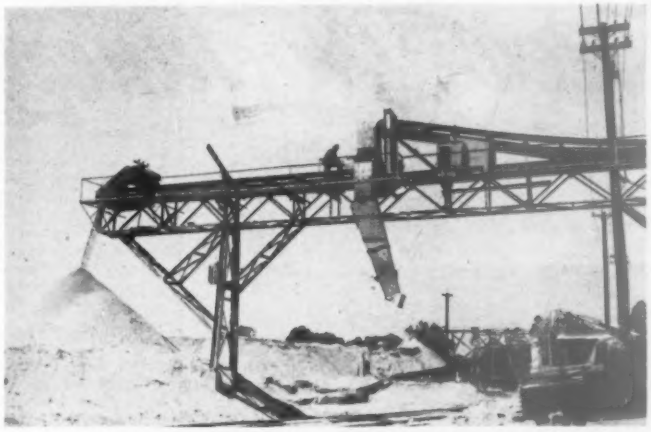
The accompanying illustration shows a U. S. geared motor that drives a bucket elevator from the tail assembly, which again is different from conventional practice. (Most designers insist on the drive being at the head pulley.) In turn, the drive for the screw conveyor feeding the bucket elevator is accomplished by an enclosed chain drive from the same tail pulley of the bucket elevator. The unit shown here handles bulk cement at a new concrete block plant in the South. It is a neat and compact installation.

### Repumping to Remove Clay

AT A SAND AND GRAVEL dredge operation in the South, three suction dredges are used in series partially for the purpose of clay removal. The first picks up the material, pumps it about 700 ft. and discharges back into the pond. The second pump makes another delivery of about the same distance and again discharges into the pond. A third dredge serves the plant, pumping the material that was discharged by the second dredge. The reason for this unusual set-up is to insure adequate washing, as each pumping helps eliminate the clay which is found in large quantities in certain gravel deposits in the south.

## Car Loading

THE ILLUSTRATION AT RIGHT shows the arrangement of a traveling tripper used at a southern crushed granite operation for loading one type of crushed stone direct from the plant. The spout from the tripper can be swung like a pendulum to load a car evenly. Although the material being handled at this plant is in the fine-size range, such a device might also prove helpful in reducing segregation. The material which is not to be loaded by-passes the tripper and is dumped to the ground-storage pile at left. Trucks can also be loaded by this method, if desired. Note the counterweight on swinging spout.



Cars or trucks are loaded from belt conveyor by pendulum-type tripper

## Surge Pile

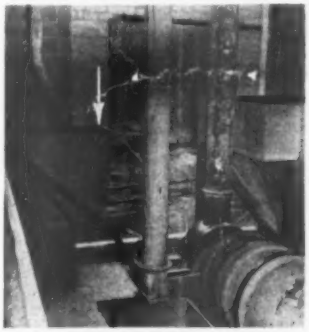
MOST OPERATORS THINK of a surge pile as immediately following the primary crusher and, in some instances, stone up to 10 in. size is being successfully placed in surge piles and later reclaimed by belt conveyor. Recently there has been a tendency toward having the surge pile follow the secondary crusher, or even the final crushing operation. In a warm, dry climate, the latter method has proved quite successful. However, for cold climates, especially where there is much snow in the winter, the larger size stone in a surge pile is considered better.

The illustrations show a 42-in. conveyor belt, fully loaded, coming from a 30-in. gyratory crusher. The stone next goes to an 18-in. secondary crusher and from there to the surge pile. A 36-in. reclaiming belt is used under the surge pile. This set-up has been used successfully by a crushed granite producer in the Southeast. Approximately 900 t.p.h. are delivered to the surge pile and 450 to 475 t.p.h. from the surge pile to the final screening and washing plant.

Top: A 42-in. conveyor belt delivers from primary to secondary crusher. Bottom: A 36-in. belt delivers from surge pile to final screening and washing plant

## Perlite Sacking

WITH THE INCREASINGLY wide acceptance of perlite, many "popping" plants have been built throughout the United States. Most of the plants get their raw material from distant sources. As perlite is so light in weight, it cannot be handled advantageously on an open conveyor belt as the wind tends to blow the material off the belt. Therefore, most perlite is sold in paper bags which are filled, for the most part, on St. Regis-type bagging machines.



Perlite from damaged bags is dumped into steel hopper (arrow) and returned to discharge end of furnace

One southern perlite operator has installed his sacking machine near the exfoliation furnace. If any of the two-walled paper bags become damaged in handling, the sackers merely dump the material in the damaged sack back into the discharge end of the furnace where a fan system returns the perlite to the sacking-machine bin. It is a simple procedure that aids in keeping the plant neat and clean. In the illustration, the arrow shows the location of the reclaiming hopper. The furnace used is a rotary, using an Inconel steel combustion tube.

## Uses for Corrugated Culverts

CORRUGATED CULVERT PIPE are being used for many purposes in the rock products industries. Large diameter pipe are being used widely for bins and reclaiming tunnels. The illustrations below show two uses. In the upper picture, corrugated culvert pipe, filled with concrete, serve as a foundation for a truck bin, and, at the same time, help protect trucks from damaging the steel supports.

The lower picture shows smaller diameter pipe, filled with concrete, serving as a base or support for a small, flat-running belt conveyor.

Corrugated culvert pipe, filled with concrete, serve as (top) foundation for truck bin, (bottom), support for belt conveyor

# New Machinery

ROCK PRODUCTS

## Control Valve

SYNTRON CO., Homer City, Penn., has manufactured a valve for controlling the flow of bulk materials from bins, hoppers and chutes in

Valve for controlling bulk material flow

weighing, blending and packaging operations; and for free air control in heating, ventilating and drying. The valve has a flexible diaphragm which, in operation, is similar to the iris diaphragm of a camera, so that rotating the control lever increases or decreases the opening and consequently controls the flow of the material. The valve can be attached to bin and hopper discharge openings, to supply chutes and ducts, and in air ducts.

## Cable-Control Mountings

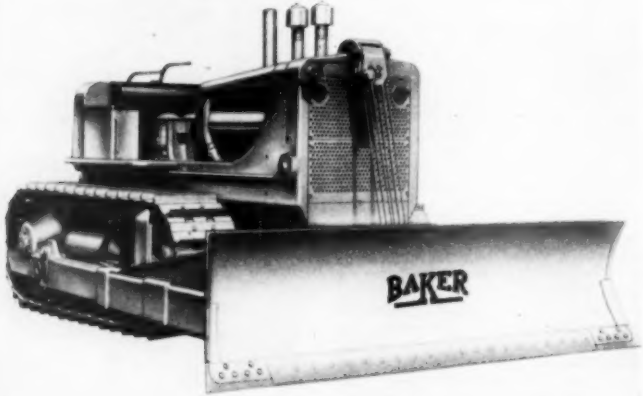
THE BAKER MANUFACTURING CO., Springfield, Ill., has redesigned its cable-control mountings for the new line of bulldozers, gradebuilders and root rippers to match the new Allis-Chalmers crawler tractors, the HD-9, HD-15 and HD-20. The company reports that the redesign provides maximum visibility, easy interchangeability, improved protection for cables and radiator and a push-beam power tilt.

## Low Speed Gear

CATERPILLAR TRACTOR CO., Peoria, Ill., is manufacturing a low speed gear group said to improve tractor-scraper performance for the company's DW10 tractors, especially in pusher-loading earthmoving operations. The new gear permits the tractors to operate at low speeds, claimed to be used for better synchronization with the speeds of pusher track-type tractors. It is said that the low gear also provides a greater potential tractive effect for self-loading operations.

## Box Car Loader

THE RAPIDS-STANDARD CO., INC., Grand Rapids, Mich., has redesigned its box car loader to have the same capacity as the former model, but to weigh 250 lb. less for increased portability. A crank-operated telescoping bed section adjusts the loader up to 16½ ft. when moving sacks from the center down to the extreme end of the rail car, and retracts up to 8 ft. as the car is filled. Both the hinged delivery section and the main bed are of 12-gauge steel box channel construction with the telescoping bed of 10-gauge steel, which is used for maximum



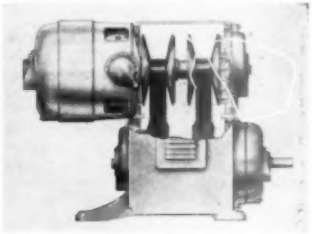

New mountings for bulldozer

Telescoping-bed conveyor

strength and rigidity. The manufacturer states that the distributing load capacity is 300 lb., handling up to 1500 100-lb. sacks per hour at the standard belt speed of 90 f.p.m.

## Dual Belt Motor

U. S. ELECTRICAL MOTORS, INC., Los Angeles, Calif., has developed a line of heavy-duty motors for variable speed ratings as high as 50 hp. To



Heavy-duty dual belt motor

carry the heavy load through the internal speed changing transmission, company engineers have incorporated dual varibelts, said to distribute the load so that no undue strain is imposed. A calibrated spring is employed to maintain pressure between the two halves of the driven vari-discs and the sides of the belt.

## Protective Coating

THE THOMAS CO., Chemical Coatings Division, Minneapolis, Minn., has developed Powerfilm, a rust and corrosion preventive coating. It is said that for all metal surfaces, Powerfilm actually gets under and displaces any moisture present, and when brushed, sprayed or wiped on, it dries to form a tough, non-oily protective film that will not crack or chip, nor will dust or dirt stick to it. The solution is easily removed with naphtha if so desired. It is shipped in 15-, 30- and 55-gal. drums and 5-gal. pails.

## Capacitor Motor

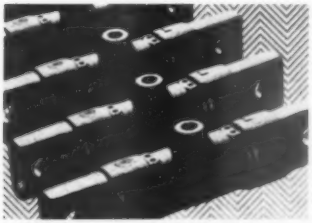
GENERAL ELECTRIC CO., Schenectady, N. Y., has announced its vertical, solid-shaft capacitor motors, featuring standardized mounting dimensions and available in ratings from ¾ to 5 hp. Principal application of the vertical motors is on jet pumps and other assemblies for supplying water to small plants and for irrigation. The company reports that the

Vertical, solid-shaft motor

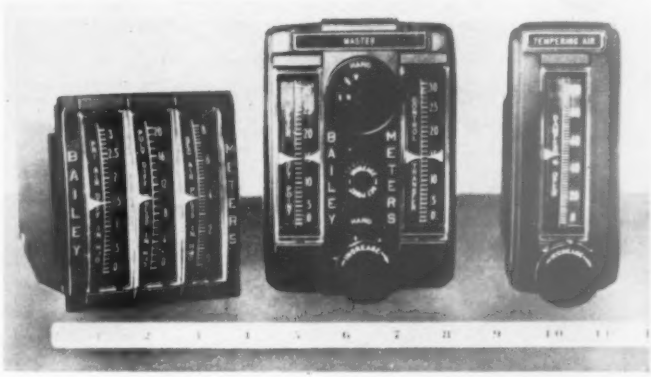
capacitor motors, with squirrel-cage rotors and no brushes or commutators, provide quiet operation without causing radio interference.

## Pneumatic Vibrators

SPO, INC., Cleveland, Ohio, has announced the availability of the new Series 77 pneumatically-operated vibrators, said to be applicable for a wide variety of industrial uses. They are recommended for such things as removing match plate patterns from sand molds, providing steady flow of powdered or granular materials from hoppers, feeding small parts for assembly and settling mixes in concrete block and vault machines. Five sizes are available with piston diameters ranging from ½ to 1¼ in. The units have facilities for single- or double-end mounting, and permit vibration either in line with the direction of material flow or at a 90 deg. angle to it.



Pneumatically-operated vibrator




Multi-point indicator, selector valve and remote manual relay

## All-Directional Vibrator

MARTIN ENGINEERING CO., Kewanee, Ill., has recently received three new patents on the Peterson Vibrolator, giving the company exclusive rights in the United States to the manufacture of this new type vibrator. The unit is used to aid the movement of coal, granular chemicals, cement, grain and other materials that resist movement toward the outlet of hoppers and bins, or where wet mixtures tend to entrain air. It is said to vibrate the storage bin effectively without causing damage to hopper or bin. The company reports that the unit is virtually noiseless in operation, self-lubricating and requires no maintenance. It is pneumatically driven, operates on air pressures from 50 to 150 p.s.i., and comes in different sizes to allow for variations in operating conditions, materials and equipment.

Storage bin vibrator

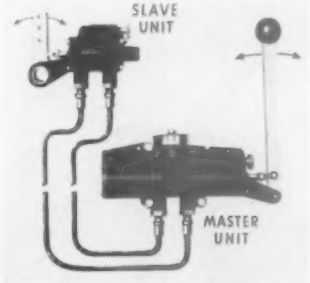
## Torque Converter Locomotive

DAVENPORT LOCOMOTIVE DIVISION, DAVENPORT BESLER CORP., Davenport, Iowa, has announced a new series of diesel-powered locomotives with torque converter drive. These hydraulic drive machines are obtainable in a range of sizes and gauges to meet the requirements of individual operating conditions, and may also be gasoline engine equipped.

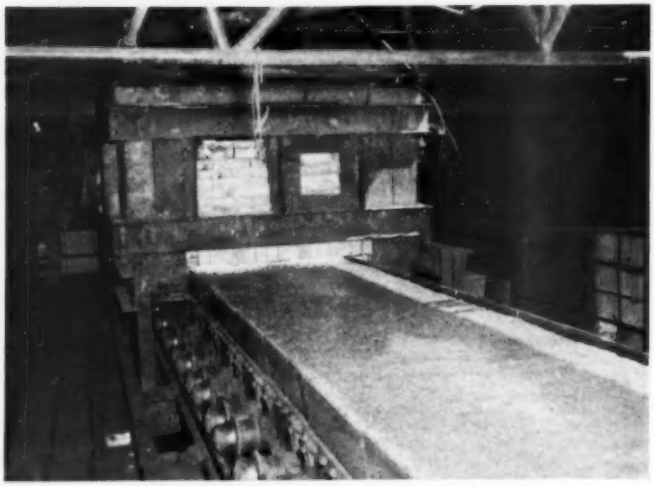
Diesel-powered locomotive

## Remote Control System

SUPERDRAULIC CORP., Detroit, Mich., is offering an hydraulic remote control system consisting of a master unit and a slave unit interconnected by two small tubes. Motion applied to the actuating lever of the master unit is duplicated by the slave unit lever, and it is said that there is positive load-carrying ability in both directions because its operation is not dependent upon springs, compressed air or valves. The unit is self-contained, requires no external power source and is capable of handling 500 in.-lb. torque.




Self-contained hydraulic control system



Ignition furnace of the sintering machine is in center. The bed in the foreground is a hot, burning mass, air being sucked down through it by windboxes

**Carolina Tuff-Lite Corp. adapts long-known process to produce aggregate with excellent properties**

**By WALTER B. LENHART**

# Sintering Clay Into Lightweight Aggregates

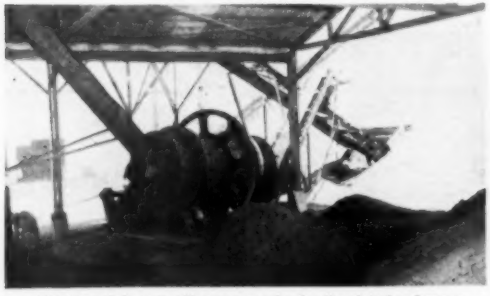
THE SINTERING PLANT of Carolina Tuff-Lite Corp., Salisbury, N. C., has been in operation about one year. The plant makes a lightweight aggregate from clay. It is the first plant in the industry to use the Dwight-Lloyd sintering process. Sufficient operating time has elapsed since the first sinter was made to establish whether or not a satisfactory lightweight aggregate could be made with the Dwight-Lloyd technique. The data that follow will establish the fact that the lightweight aggregate made by Carolina Tuff-Lite Corp. is of the highest quality and is finding a ready acceptance in the sales area the company serves.

Carolina Tuff-Lite is owned by A. Starling Johnson, Allen S. Johnson, Jr., and Enoch A. Goodman, Jr. Mr. Johnson and his son operate the Johnson Concrete Co. at Salisbury and are building a second block plant in the Southeast. The Salisbury block plant produces around 5000 standard 8's per 8-hr. day and about 1500 linear feet of concrete pipe. Mr. Goodman operates three sand and gravel operations in the Southeast. These are: B. V. Hedrick Gravel and Sand Co., Lilesville, N. C.; Cumberland Gravel and Sand Co., Fayetteville, N. C.; and Grove Stone and Sand Co., Asheville, N. C.

## Process

The Dwight-Lloyd sintering process is an old one, having first come to the forefront some 35 years or more ago. The process was developed as a process to roast metallic sulfide ores (such as copper sulfide ore) and thereby to produce a clinker or sinter that lent itself better to conventional smelting practices; thus from a mechanical standpoint the Sintering Machinery Corp., Netcong, N. J., has almost a life-time of experience in the sintering field. The main thing that is new about the process is its ready adaptation to the production of a lightweight concrete aggregate.

In carrying out the roasting of ores or mill concentrates, a bed of the finely ground ore is made on a traveling grate. In this case, the sulfur in the ore supplies the fuel and after it has been ignited air is drawn downward through the ignited bed. By the time the material has been discharged from the traveling grate the mass has reached the stage of incipient fusion, is practically devoid of sulfur and physically is in a satisfactory shape for smelting in the blast furnaces.



This 5- x 9-ft. rod mill prepares coke for the sintering furnace

Loading in the pit. The clay is reddish in color

Cooled sinter cake is dumped by the stiff-leg derrick to an apron feeder, which in turn feeds the 60-in. x 12-ft. rotary screen

Rail and truck loading conveyors are at right, recovering material from the stockpiles under the sizing screen at right

The major change in the early process hinged on the fuel used. At Salisbury pulverized coke is intermixed with the clay; after ignition this burns within the bed to give sufficient heat to semi-fuse the mass and change it into a material satisfactory for concrete aggregate. The amount of fuel per cubic yard of material made is said to be lower than for any other type of artificial lightweight aggregate. The amount of free carbon in the finished clinker is said to be practically nil. The unit is producing about 45 cu. yd. of sinter per hour.

Where combustion is maintained in a bed of ignited material by downdraft and temperatures developed are sufficiently high to cause near fusion of the bed of material, the design of the traveling grate is of great importance. The Dwight-Lloyd sintering machine is made up of a series of cast-iron pallets each 42 in. wide and 24 in. long. These are in turn fitted with Mallix finger-type grate bars that are replaceable. About 14 percent of the pallet openings consist of longitudinal slots ¼ in. wide. To help protect the grates from the high temperatures in the bed, operations are conducted so that a relatively thin bed of previously sintered material can be put directly onto the grate; the clay to be sintered is then placed on top of this protective layer. However, at the Tuff-Lite operation the feed to the pallets is such that the coarser fractions of previously sintered material form some of the bedded portions.

A Type -EKS Dwight-Lloyd machine is used at the Carolina plant. It is 42 in. wide and 66 ft. long over the windbox section. The machine is at ground level and produces a sinter cake that is roughly 8 in. thick. However, the pallets have flanged replaceable sides so that beds from 6 to 14 in. deep can be carried.

## Pallets

The pallets are pushed along the upper track and under the feed hopper where a swinging spout discharges the clay-coke mixture onto the traveling pallets, building up an evenly distributed bed. It is at this point that the larger pieces of previously sintered "returns" can roll down the pile of clay-coke and bed themselves next to the grate. Provisions are made so this layer can be increased in depth to give more protection to the grates, or to reduce dust to the suction draft fan. The filled pallets next pass continuously into the ignition furnace, which takes up about 6 ft. of the machines' total length. The furnace is of firebrick construction. Here two low pressure Hauck light-oil venturi burners fire directly into the ignition furnace. Here temperatures are sufficient to ignite the coke in the traveling bed. As the ribbon of ignited material slowly moves toward the discharge end of the grate, air is drawn downward through the mass. So-called "windboxes" form part of the exhaust system and are provided with dust traps which may be emptied at any time without interfering with normal operations. Suction to the windboxes is provided by a 45,000 c.f.m. (at 250 deg. F.) fan directly connected to a 300-hp. Westinghouse motor operating at 900 r.p.m. A damper at the fan's inlet allows it to be started with no air load, using a reduced voltage compensator. SKF bearings and a Lovejoy coupling are essential parts of the fan assembly.

Pallets are carried on 70-lb. steel rails and a replaceable seal is provided by movable steel seal bars alongside the windbox tops. The bars are held in contact by counterweights. Pallets discharge by passing to the lower track, in an inverted position, along formed guides where they return to the drive sprockets on downward inclined 70-lb. rails.

## Control Details

Directly under the driving sprocket shaft they contact the teeth and are driven back and up to the upper track in machine fabricated "C" shaped guides. A drop track safety device is provided at the point of sprocket entry. It operates cut-off

Sinter cake falls from the machine onto this grizzly and into pit, where water is sprayed over it

Another view of clamshell dumping to feeder and rotary screen. Oversize falls to 10- x 36-in. jaw crusher below screen

Stiff-leg derrick spreads hot clinker from pit for cooling around its traverse, and reclaims the cooled material for crushing and sizing

switches so no damage will occur if obstructions or other causes do not allow proper meshing between the sprocket teeth and the pallet drive rollers. The guide curves are set so their center is behind the center of the sprockets in such a manner that a separate loop is formed. The sprockets are set so a slight gap in the strand occurs just before the upper driving teeth takes the drive strain, allowing the pallets to lie flat on the machine dead plate at the time compression on the driving face occurs. This prevents "racking" and misalignment, without use of wedges, springs, or heavy pressures to press them into position. Adjustments to maintain the gap after operating wear occurs are provided.

The flow of raw material in the plant ahead of the sintering furnace permits the accurate blending of the clay and coke with the inclusions of "returns" of previously sintered material. After the blend has been made, the material next is conveyed to a "pelletizer." This is a drum-type mixer with its paddle shaft directly connected to a 10-hp. U. S. Electrical Motors Syncrogear unit that operates at 84 r.p.m. Some water can be added in the pelletizer if desired. From the pelletizer the mixed material drops to the swinging spout and into the pallets.

It is quite significant that the only change in the process since its inception a year ago has been the installation of a 5- x 9-ft. Jackson and Church rod mill to replace grinding equipment previously used to prepare the coke for the sintering furnace. Also, a 36-in. Telsmith fine reduction crusher was installed to serve as a secondary crusher in preparing the finished Tuff-Lite. This replaces a unit formerly used.

## Raw Material

The clay used is a reddish material and is secured from a pit near the plant. The haul is about 1200 ft. Brush and other surface vegetation is pushed aside with a tractor and blade.

The preparation of the clay portion can be determined in more detail from the line drawing. In the pit a 1-cu. yd. Bucyrus-Erie shovel loads to trucks, which discharge to the raw clay hopper. Under this is a 4-roll J. L. Steele & Co. clay feeder. Pit-run clay can be stored under cover nearby if conditions require. The second step in the clay processing is its passage through a Miller hammermill followed by screening through ½-in. spaced piano-wire clay screen. Oversize can be returned for recrushing.

Belt conveyors are used throughout the plant both in the clay and coke preparation sections and in the handling of the finished Tuff-Lite. Where feeding or blending is required, belt-type feeders are used under the various hoppers with adequate controls. The so-called "collector belt" serving the pelletizer is provided with a 10-hp. Reeves drive which enables the sintering machine operator to control the amount of feed without upsetting the clay-coke-returns ratios.

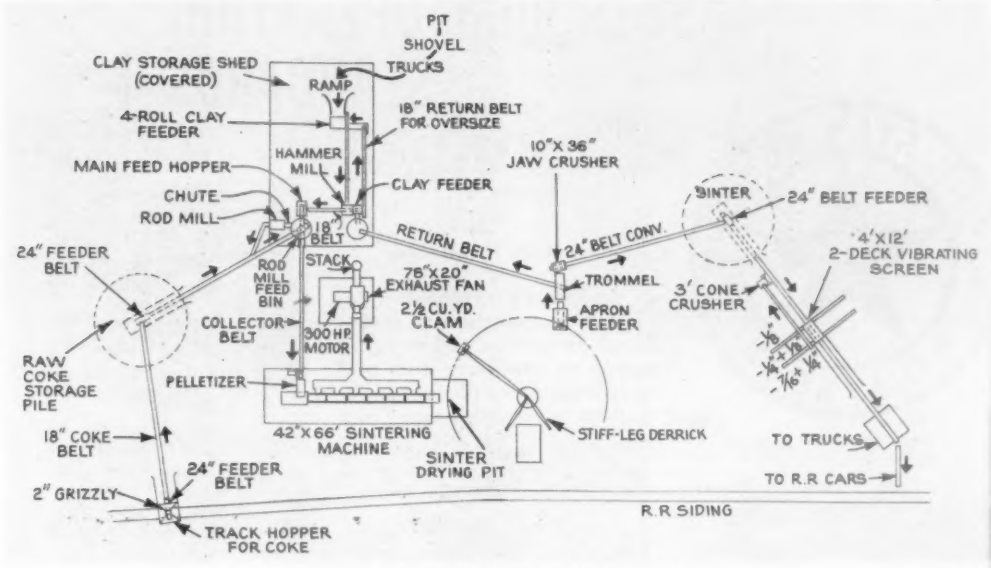
The clinker from the sintering machine falls to a pit where a small amount of water is nozzled to it. A 2½-cu. yd. Clyde Iron Works stiff-leg derrick piles the material around the perimeter of the pit where it cools sufficiently to be handled on the rubber conveyor belts. The cooled sinter is then fed by the clamshell to an apron feeder serving a 60-in. x 10-ft. Telsmith rotary screen. All ⅝-in. material is removed here and returned to the sintering machine to form the bedding material on the traveling grate. The oversize is then crushed in a 10- x 36-in. Cedarapids jaw crusher and the material is conveyed to a ground storage pile. A reclaiming belt operates under this pile and serves a 4- x 12-ft., 2-deck dry Seco vibrating screen that is mounted on an elevated structure so the three sizes of finished material can fall to storage below. The oversize is belted back to the 36-in. Telsmith crusher and then returned to this screen.

Coarse material from the primary crusher is coming off the conveyor at right. This is transported to the 4- x 12-ft., 2-deck screen by another conveyor operating in the tunnel (visible under crusher). Oversize is returned to the 36-in. crusher at right, and sized material falls to storage below the elevated screen

## Processing Sinter

As the cake of sinter discharges off the end of the sintering machine, it passes over a rail grizzly. The throughs from the rail grizzly form part of the "returns" for grate bedding. An improvised chain drag removes the throughs from under the grizzly and puts them over a belt conveyor serving the clay preparation plant. The three sizes of material made are plus ¼ in. minus 7/16 in.; plus ⅛ in. minus ¼ in.; and dust. These fall over another reclaiming tunnel where gates permit delivery of a blended material or of any individual size to the belt conveyors serving the car and truck loading facilities.

The finished sinter is a rather harsh material, almost black in color, and in many ways resembles the Western volcanic sinters or scorias that have lightweight characteristics. It is a very stable aggregate and in normal uses makes a concrete weighing 100 to 102 lb./cu. ft.




Layout of the Carolina Tuff-Lite lightweight aggregate plant

## Test Data

Five 3-core load-bearing block made from Tuff-Lite taken from the yard of the block manufacturer gave the following strengths. The block were 27 days old at time of test. It will be noted that the units passed A.S.T.M., federal and North Carolina state requirements:

| Weight as received lb. | Breaking load lb. | Compressive strength (gross area) p.s.i. |
|---|---|---|
| 31.3 | 190,000 | 1596 |
| 32.0 | 186,000 | 1563 |
| 31.4 | 172,000 | 1445 |
| 31.3 | 164,000 | 1378 |
| 32.0 | 172,000 | 1445 |
| | Average: | 1485 |

The following test data relate to the wet-dry contraction of concrete made from Tuff-Lite. In carrying out the test two brass pin inserts were mounted on the center line of one face of each block. Holes were drilled into the face of the block in line with the approximate center of the end webs, to a depth of one inch. Brass pins of 5/16-in. hexagonal stock, 1-in. long, were grouted into these holes. Holes of 1/16-in. diameter were drilled in each pin to serve as gauge points.

The resultant gauge length was 13.2 in. and varied only .006 in. from maximum to minimum on the five block. The figure of 13.2 in. has been used as the gauge length for all specimens. Changes in gauge length were measured to the closest .0002 in. using a Whitmore type strain gauge with 1.96:1 multiplying factor and a Federal micrometer dial reading to .0001 in. Comparative readings were made on a standard metal bar, and corrections made to compensate for variations on the standard.

Results are reported below calculated to the nearest .0001 in. per foot of length.

After the gauge points were mounted in the block each specimen was immersed in water at room temperature for 24 hours. At the end of that time the specimens were drained for 1 min. and wiped with a damp cloth in accordance with A.S.T.M. C140-39. They were immediately weighed, and measured with the strain gauge. They were then oven dried for 72 hours at 215 deg. F. to 240 deg. F., reweighed and remeasured.

Shrinkage (wet to dry)
Inches per ft.

| 1st cycle | 2nd cycle | 3rd cycle |
|---|---|---|
| .0043 | .0025 | .0034 |
| .0046 | .0045 | .0031 |
| .0045 | .0043 | .0023 |
| .0052 | .0039 | .0041 |
| .0045 | .0034 | .0043 |
| .0046 | .0039 | .0034 |

## Test Data on Aggregates

| | F.A. |
|---|---|
| Passing ¾-in. sieve | 100.0 percent |
| Passing No. 4 mesh sieve | 92.3 percent |
| Passing No. 8 mesh sieve | 58.9 percent |
| Passing No. 16 mesh sieve | 39.6 percent |
| Passing No. 30 mesh sieve | 25.8 percent |
| Passing No. 50 mesh sieve | 13.6 percent |
| Passing No. 100 mesh sieve | 5.1 percent |
| Specific gravity (bulk) (s.s.d.) | 2.23 |

## Motors

The horsepower requirements for those units directly related to the sintering process from the collector belt to the crude clinker are as follows:

Collector belt—10 hp., through Reeves drive, 62.8 r.p.m.
Pelletizer—10 hp., U. S. Syncrogear motor, 84 r.p.m.
Dwight-Lloyd sintering machine—15 hp., U. S. Vari-drive motor, 3:1 ratio.
Swinging spout—1 hp., U. S. Syncrogear, 25 r.p.m.
Fan—300 hp., Westinghouse 900 r.p.m. direct connected.

Piece of sinter coke 42 in. wide and 8 in. thick, about to fall off the end of sintering machine into cooling pit

Equipment used in the plant of Carolina Tuff-Lite Corp. not previously mentioned includes Continental Gin conveyor equipment, Alemite lubrication on the sintering machine, McGill needle-type bearings on wheels supporting the pallets, Garlock grease closures on bearing assemblies of pallet axles, and American Pulley torque-arm type reducers on some of the drives. An Allis-Chalmers front-end loader is used around the pit and yard.

# LONE STAR'S NEW VIRGINIA PLANT SETS HIGH OPERATING STANDARDS

By
BROR NORDBERG

**Long dry process kilns, details of operation to attain high efficiency and stress in design to eliminate dust and improve working conditions highlight cement industry's newest mill**

A HALF-CENTURY OF CEMENT manufacturing experience is represented in the design and operation of the new plant of Lone Star Cement Corp. at Lone Star, Va., which shipped its first cement in June, 1951. This mill is the first completely new operation of the corporation that has been built in many years and reflects the most up-to-date practices, based upon the accumulated experiences of engineering and operating executives who have a long and recognized background in the industry.

The first plant of Lone Star was built at Dallas, Texas, around the turn of the century and 15 mills have been in operation at widely scattered locations for many years. All of them have been progressively modernized over the years, and there have been enlargements to capacities in a number of them, which has given the corporation much to draw from in designing a new mill which is its conception of the "ultimate" in what a mill should be. With completion of the new plant and a similar mill soon to begin operations in West Texas, the company will have 17 plants with a combined annual capacity of 31,000,000 bbl. of cement. The highest annual production for the entire U. S. industry was the approximate output of 228,000,000 bbl. in 1950.

Location of Lone Star, Va., is in Botetourt county, approximately 15 miles north of Roanoke in southwestern Virginia, on a site that represented the best combination of deposit, accessibility and proximity to principal markets in West Virginia, North Carolina and western Virginia. The actual site of the plant is, in fact, the only location anywhere near the area where suitable high-grade limestone for cement manufacture is available.

This being an entirely new operation, in a mountainous location which was selected because of the available deposit of high calcium limestone, there were many obstacles to the establishment of a plant. Some 500,000 cu. yd. of rock, shale and earth had to be excavated, of which 150,000 cu. yd. were moved to clear the site. There were no rail facilities, so a 9-mile railway was built by the company from Cloverdale as an extension to the N. & W. railway, in order to get the equipment in and to provide for rail shipment of cement. The line, known as the Cloverdale & Catawba Railway, has been sold to the N. & W., and a spur track and five switchtracks have been provided within the plant.

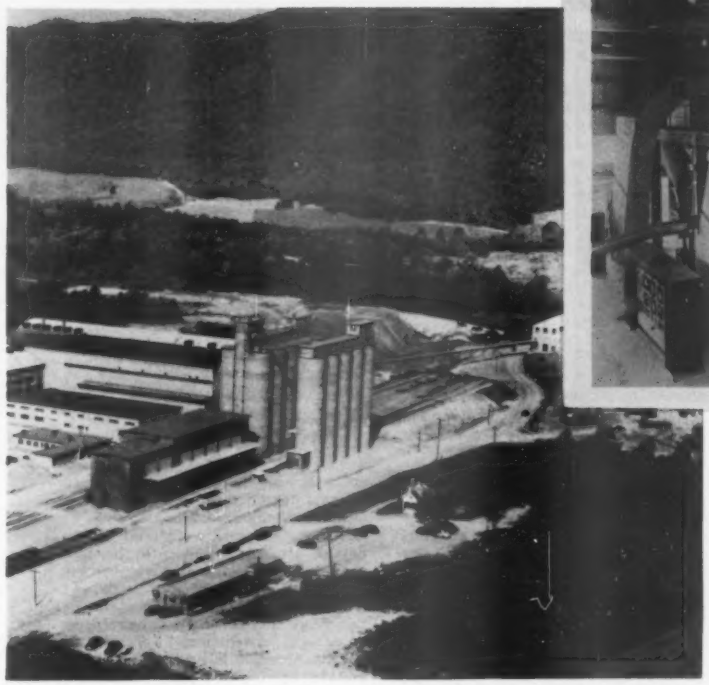
Another complication was the availability of water supply. It had been decided to build a dry process plant, with long kilns, for reasons of economy of operations and because the raw materials lent themselves well to that type of operation, but the potential available supply of water would, in any event, have dictated against a wet process plant. A concrete dam was built across adjacent Catawba Creek to form a lake of a million gallon capacity to guarantee a year-around water supply. Requirement is 350 g.p.m. for operation of water-cooled kiln burner tips, compressors, and for other uses, which is pumped into a 30,000 gal. tank in the mill. The cooling water is returned to Catawba Creek as no process water is actually consumed such as is the case with a wet process plant.

Grading was begun on May 28, 1949, and completed on January 24, 1950. Ground was broken for the plant on July 1, 1950, and the first stone was put through the crusher on April 5, 1951. The first kiln was fired on May 3, 1951, and the second one went into production on May 11.

## Plant Layout

This plant has two 10- x 340-ft. rotary kilns, which are among the largest dry process kilns in the industry. Their selection was based upon the fact that the available raw materials, by virtue of their chemical uniformity and favorable physical characteristics, could be processed to produce a very uniform product at economical cost. Another factor was that a favorable power rate was available from the Appalachian Electric Power Co. The company has had good experience in the operation of long dry process kilns at its Nazareth, Penn., plant where, in recent years, the 175-ft. original kilns had been lengthened. Fuel consumption in the 11-ft. 3-in. x 295-ft. kilns now in operation at Nazareth has averaged less than 1,000,000 B.t.u. per bbl. at the high production rate of 2600 bbl. of clinker per day.

At Lone Star, the plant layout is an L pattern, with the kilns representing one leg of the L, and a long covered storage building for raw materials, coal and clinker at right angle to the kilns. Paralleling the storage building



Air view of completely new dry process plant located at Lone Star, Va., near Roanoke. Crushing plant, right, delivers stone and shale by long belt conveyor to mill storage. On left are stock dust collectors and storage and blending silos, with kilns visible beyond. Two long buildings with barrel-type roofs are the storage building for raw materials and clinker (far side) and the grinding mill building (dark roof). Cement silos are on both sides of railroad tracks with packhouse adjoining

On kiln operating floor at bottom are seen one of kiln instrument panels and coal feeders to direct firing coal pulverizers which are on next lower level

Office and laboratory are in L-shaped building convenient to all departments

and alongside, on the inside of the L, is the grinding mill building, housing both the raw mills and finish mills under a single roof. This has the advantages of convenient and economical feed to the mills by overhead cranes and bins, and maximum utilization of manpower in the grinding department.

Also, within the legs of the L are the combined laboratory and office building, the bank of raw materials storage and blending bins which are very close to the feed ends of the kilns, and the shops, storeroom and employe service buildings. Each building is thus part of a compact arrangement, making each division of the plant conveniently accessible from any other department. The laboratory, for example, is so located with respect to the raw materials storage and blending bins that the chemists hardly need go out of the laboratory to take their samples and relay the results of their analyses. Packing of cement and the loading of bulk cement or sacked cement into railroad cars are done just across the road from the office. Workers need only step out of the service buildings after their showers to get into their cars at quitting time.

Balance of the layout consists of a primary crusher building and a secondary crushing building from which crushed limestone and shale are delivered into covered storage by belt conveyor. At present, the haul from the limestone and shale quarries to the primary crusher is approximately 500 ft.

The layout has provided for 50 percent future expansion, which would involve a third kiln and additional finish grinding capacity for which space has been set aside in the mill building.

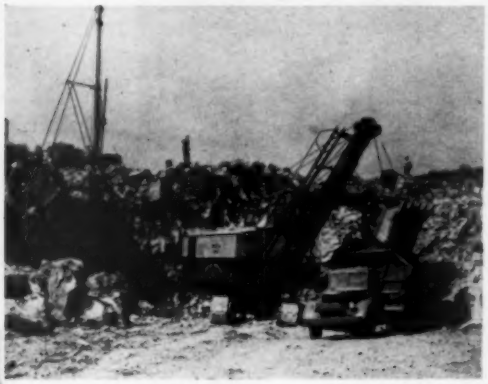
## Mill Construction

The mill buildings strike an impressive picture, being entirely of concrete construction and featuring the generous use of concrete masonry as well as structural concrete. The only exception to the complete use of concrete are the superstructures for the crusher buildings which are of steel framing with Johns-Manville Transite siding. Particularly noteworthy are the combined mill and storage buildings which have two 75-ft. span parabolic arches with monolithic thin-shell concrete roofs. The office and laboratory building is a 1-story L-shaped structure of concrete masonry construction and is completely air-conditioned.

The machine shop, which can handle all major repairs, electrical shop, storeroom, foremen's offices, service rooms and meeting room (for 200 people) are housed in a single structure of reinforced concrete skeleton construction faced with concrete masonry units.

Principal objectives of the plant design were to achieve high efficiency from both equipment and men, and dust-free plant operations. It is apparent throughout that every effort has been made to eliminate back-breaking work wherever possible, to provide adequate lighting and ventilation, to eliminate dust, and to make conditions as easy and as pleasant as practicable for the men.

The tops of the raw material silos and the finished cement silos are reached by Otis passenger elevators. A Hough Payloader is used to facilitate maintenance and cleanup throughout the plant, and a Tow-



Left: A new limestone quarry is in process of development. Two-way side-dumping truck-trailer combinations deliver limestone and shale to crushing plant. Right: A reinforced concrete dam was built across Catawba Creek to create a lake for a guaranteed water supply. Water is pumped to a storage tank in the mill

motor was provided to handle heavy parts such as refractories, sacks, repair parts and machinery parts. Overhead cranes are spotted wherever heavy machinery parts must be raised from inaccessible locations and a 2500-lb. Sedgwick freight elevator handles refractories up to the kiln floor. Refractories will be palletized, as will empty sacks, for handling by lift trucks. Locker rooms, shower rooms and first aid facilities are centered in the service building.

Stone is delivered by 980-ft. belt conveyor into mill storage from secondary crusher in background. Quarry is a short distance beyond

General design was developed to emphasize good housekeeping and safe working practices, and the plant probably is the most dust-free cement mill in existence. There are 18 automatic bag-type collectors spotted throughout the plant and the kilns exhaust through both mechanical and electrostatic dust collectors in series. Volumes of air handled through the dust collectors are such that the large mill building actually is under a very slight negative pressure. It has a minimum of windows, but light is provided through glass block, and ventilation through louvres, with the result that the mill building is kept free from dust.

## General Operating Features

This plant is one of very few that have been built which have been designed from the beginning to manufacture all types of portland cement and, as a result, provisions to prevent contamination of one product with another, and the flexibility to permit the manufacture of different cements represents advanced practice. Lone Star standard portland cement and Incor 24-hr. portland cement are produced and, among the special products, are air-entraining portland cement, modified and masonry cements. Important to the flexibility is the duplicity in operations throughout, whereby each kiln with its related equipment, even to stack dust collectors, is independent of the other and each grinding circuit may be operated separately from the others. This duplication, which makes each operation independent of identical operations, carries through the entire plant.

The role of maintenance figured prominently in the plant layout and construction; good practices as proved in other Lone Star mills were taken into consideration, and every effort was made to eliminate trouble points as experienced in the other mills. Clear stairways, walkways and roominess around all equipment have been provided for safety, and to make every machine unit accessible for easy maintenance. In contrast to the majority of older plants, capacities of the various individual equipment are not critical to the continuity of operations. In the raw grinding, for example, capacity is sufficient to permit a thorough job of preventive maintenance. Similarly, in the finish mill, there is excess capacity. The main electrical switchboard is in a ventilated and filtered leanto alongside the mill building and electrical switchgear and transformers are segregated to seven strategically located master substations.

Among other of the more interesting features are: (1) insulated and decked upper surfaces of air separators to provide a cool area for inspection and maintenance; (2) feed of raw material initially into each mechanical air separator, which is in closed circuit with a ball mill, with drying air introduced into the separator; (3) use of drag conveyors for dust-free handling of mill feed; (4) air-cooled kiln discharge ends; (5) two-stage dust collectors for the stack gases; (6) closed-circuit operation of the impactor in the crushing plant; and (7) the introduction of cooling air into the finish mill air separators to cool the cement and to draw off heat in order to facilitate repair and maintenance.

## Quarrying

Limestones throughout southwestern Virginia are high in magnesia and unsuitable for cement manufacture except for the occurrence at Lone Star, Va., where a high calcium ledge outcrops generally over the area. It is said by geologists that tilting of the earth's crust at the time a nearby mountain was formed exposed this particular ledge of limestone which occurs to a depth of 200 ft. and is underlaid with magnesium limestone. The stone is very uniform in analysis, 95 percent $CaCO_3$, and is identified as Lenoir limestone.

There is little overburden except for occasional clay pockets that are difficult of removal. This surface soil is removed by a ¾-cu. yd. P&H trench hoe and hauled to waste by truck. Progress is underway, on a downward slope, to the development of a 75-ft. face using two Bucyrus-Erie 27-T diesel-driven blast-hole drills with 7-in. bits. Jackhammers are employed for secondary drilling. Extent of the company-held deposit is approximately one-half mile across.

A suitable shale occurs extensively in the area and a shale quarry is being developed adjacent to the limestone quarry using wagon drills, and the same excavating equipment and haulage equipment for plant delivery.

The shale, identified by name as Athens, has an analysis ranging from 36-50 percent $CaCO_3$ and is high in silicates. As a result, a cement with silica ratios in the 2½ to 3:1 range is produced, having high strength characteristics and approaching a type II cement. A considerable stockpile of shale, excavated in building of the plant, is also available for cement manufacture. Alkalies in the raw materials are very low. Thusfar it has been unnecessary to add to the mix any iron-bearing or siliceous material although provisions have been made for these additions in the plant storage building and in the installation of proportioning equipment in the mill building.

Limestone and shale are excavated and handled separately. There are two 3-cu. yd. type 492 Marion electrically-powered shovels, and haulage to the primary crushing building is by three truck-trailers. Each unit is a Mack model LFT diesel-driven tractor with an Easton model TP11, 11-cu. yd. side-dump trailer. Dumping into the primary crusher is accomplished on either side through a self-engaging Easton elbow-type hook. The operator has a remote control switch to regulate the rate of dumping into the primary crusher.

## Crushing Operations

Reduction is to 6 in. top size through a 42-in. Allis-Chalmers Superior-McCully gyratory driven through Texrope by a 200-hp., 440-volt Allis-Chalmers electric motor. A good example of the detail in planning for future repair and for replacement is that a dolly has been located adjacent to the bottom of the crusher for easy transfer of heavy parts which can then be hoisted out of the pit.

A 42-in. x 280-ft. Chain Belt coarse rock conveyor (No. 1) conveys the stone into a surge hopper over the reduction crusher in the secondary crushing building. A 60-in. x 7-ft. 6-in. Chain Belt apron feeder regulates the flow into a size CF 15-50 Pennsylvania Impactor which is direct-driven at 900 r.p.m. by a 400-hp., 4000-volt motor.

It is of interest that the Impactor is operated without grates and in closed circuit with vibrating screens in order to effect the best possible particle size range, within close limits, for grinding. The crushing circuit is designed to eliminate the critical oversized particles detrimental to best grinding efficiency, while holding down the production of fines to lighten the dust load which must be handled in the raw grinding circuits.

The hammermill product is carried over a 42-in. x 125-ft. belt conveyor (No. 2) and the stream is divided over two 5- x 11½-ft. single-deck Ripl-Flo rod deck screens with ⅝-in. slotted openings. Oversize is conveyed over No. 1 conveyor back to the surge bin from which the secondary crusher is fed. The circulating load through the Impactor is estimated at 30 to 50 percent.

Minus ⅝-in. stone (or shale) is transported to the main storage building at the mill over a 24-in. x 980-ft. belt conveyor which has a speed of 500 f.p.m. This is a single conveyor flight mounted on steel trusses and frames on concrete footings. Most of the conveyor length is in the open and the belting and idlers are covered with short sections of removable corrugated metal hoods. Small openings in the hoods at the idlers permit insertion of the pressure gun fittings for lubrication.

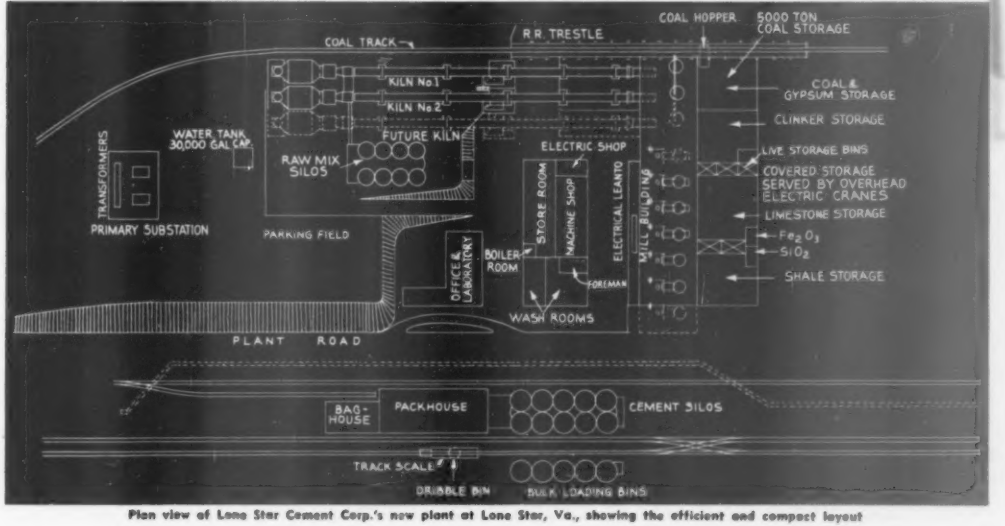
All the belts have self-aligning idlers, and both the primary crushing and secondary crushing buildings have Sly bag-type dust arrestors which automatically return collected dust into each system. In the primary, the principal source of dust is at the point of discharge on to conveyor No. 1. Dust drawn from this point is put back on the conveyor.

In the secondary crushing plant, one collector is stationed near the vibrating screens which are completely housed in a room. The second collects dust at the point of feed and at the discharge from the Impactor, also from belt No. 3, and the collected dust is deposited back on to belt No. 3.

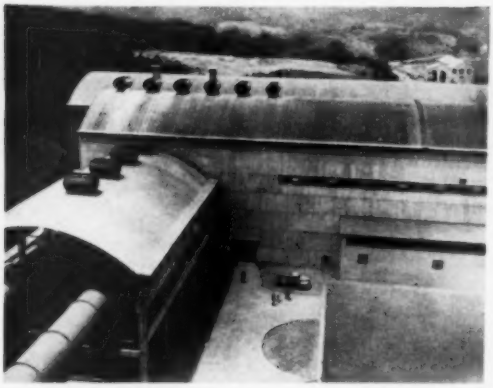
## Material Storage

As stated earlier, there is a single long storage area of monolithic concrete construction, measuring 75 x 340 ft., comprising one leg of the L plant layout, with a single parallel mill building adjoining. From the kiln firing end, at the junction of the two legs of the L, there are four major storage areas, for coal (3000 tons), clinker (25,000 bbl.), shale (11,000 tons) and limestone (8500 tons) respectively. Shale comprises only about 35 percent of the raw mix but larger storage is set aside for it than for limestone in order to reduce the number of changeovers from quarrying limestone to the excavation of shale.

Between the shale and limestone storage areas are five separate 325-ton live storage bins—two for limestone, and one each for shale, sand and iron-bearing material. Arrangement is such that material may be proportioned out from the several bins below for transfer into the raw mill room by a drag conveyor at right angles to the long axis of the storage




**Plan view of Lone Star Cement Corp.'s new plant at Lone Star, Va., showing the efficient and compact layout**



Left: Two large buildings for storage of raw materials and clinker (far side) and grinding mill department in front of it feature concrete roofs. On left are kilns looking toward firing ends. Clinker coolers and coal mills are on lower level below kilns. Right: Main silo structure has ten self-cleaning silos holding 130,000 bbl. of cement. On right is packhouse. A separate bank of five silos is used for bulk loading

building. Similarly, four live storage bins are arranged between the clinker and shale main storage areas, for transfer into the finish mill room. Two bins are for gypsum, a third is for clinker and the fourth is either for clinker or for limestone when masonry cement is to be manufactured.

All materials are distributed into and reclaimed from the various sections and transferred to the live mill feed bins by two Bedford 10-ton overhead electric traveling cranes with 3-cu. yd. Blaw-Knox buckets. Coal, gypsum, sand and ore are received at the plant in hoppered cars, dumped from a trestle into a receiving section, and are rehandled by the cranes.

## Raw Grinding

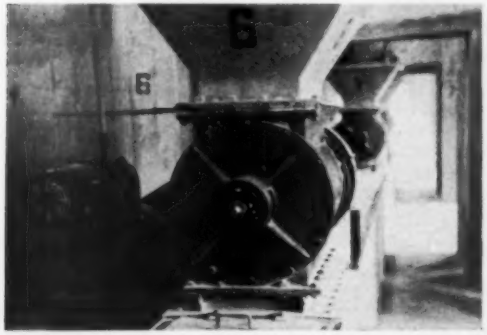
Raw grinding is done through two separate systems of a mechanical air separator in closed circuit with a ball mill. The feed for each grinding circuit is delivered to the air separator first, where heated drying air is introduced, and only the rejects are put through the ball mill.

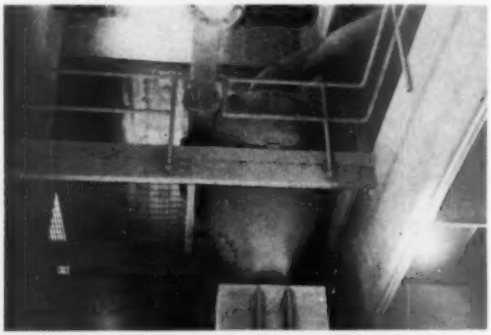
Purpose of this system is to remove acceptable fine material ahead of the grinding mill and to eliminate overgrinding, thereby producing a more uniform product and conserving power. The mill is thus fed a sized material which permits its optimum performance. Circulating loads, as a result, are about 300 percent and there is not an excess of extreme fines to be fed into the kilns. Ammeters on the elevator and separator drives will indicate the loads carried. With long, dry process kilns, it is desirable, wherever practicable, to eliminate conditions that add to the dust load carried by the exhaust gases.

Five 24-in. type WS Merrick Feedoweights, one for each live storage bin, proportion the raw materials to a common Kensington Ken-Krome drag chain conveyor which transfers the blend of materials to a chain bucket elevator on 61-ft. centers, which then transfers to either of two overhead drag chains filling one or the other 100-ton mill feed bin. The Feedoweights are enclosed and have starvation switches. They weigh and record the materials handled, and they can be adjusted quickly as a control over the raw mix proportions. Drag chain conveyors were selected in order to minimize dust and spill.

Each system is supplied from its feed bin by a 24-in. x 4-ft. 1½-in. Chain Belt apron feeder and 65-ft. chain bucket elevator which discharges into a 16-ft. Sturtevant mechanical air separator. Rejects from each air separator are fed into a 9½- x 15-ft. Allis-Chalmers ball mill and the mill output is transferred by a screw conveyor back into the elevator feeding the air separator.

Heated air in each system is supplied by an Air Devices, Inc., 6,000,000 B.t.u. per hour oil-fired, hot air furnace, and is drawn through the air separator and exhausted through a 35-ft. Norblo bag-type dust arrestor and exhaust fan. Fines from the air separator, and from the dust collector, with an average fineness of 92 to 94 percent passing a 200-mesh sieve, are fed by a screw conveyor into the hopper of a 9-in. Fuller-Kinyon type H pump and transported through an 8-in. line into the raw material storage silos. The pump is driven by a 100-hp. motor and is supplied air





Left: In raw material storage and blending silos, rotary valves are means of withdrawal to screw conveyors. Right: Dust alleviator at top of pulverized raw material silos receives stream through pipeline from mill and discharges into screw conveyor which fills silos

from a Fuller C-200 rotary air compressor driven by a 125-hp. motor.

Each mill is driven at 19.2 r.p.m. by a 700-hp., 180-r.p.m., 4160-volt synchronous motor with 80 percent leading power factor and carries a charge of 90,000 lb. of 3½- to ⅝-in. forged steel grinding balls. Lincoln 440-volt, 22-amp. arc welders are hooked electrically into the motor circuit, for all grinding mills, in order to inch them. Production is approximately 30 t.p.h. for each of the two grinding circuits.

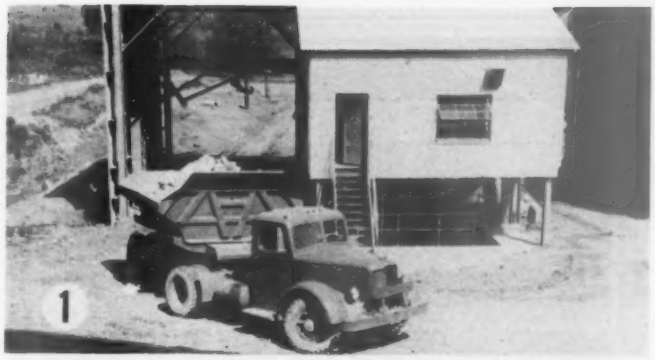
Through use of the Oil-Therm system of oil tank storage, which heats through electrical resistance and conduction, ordinary Bunker C fuel oil is successfully used to fire the hot-air furnaces. Temperature in the mechanical air separators is held in the range of 450 deg. F. and the temperature at the Norblo bag filter inlets is held at 200 deg. F. to prevent condensation in the collectors. A thermocouple automatically controls firing of the furnace.

Ducts from the furnace, the elevators, screw conveyors and air separators are externally covered by mineral wool blankets for heat insulation. Each air separator in the plant has its top covered over with a layer of block insulation, and a top deck was installed so that the drives are conveniently accessible for maintenance. The drive consists of a 100-hp. motor with Falk gear reducer direct-connected through a flexible coupling, making a compact drive which is positive and free from slippage.

This detail of insulating and decking over the separator tops is a very practical idea. In most conventional air separator installations maintenance and adjustments are difficult due to the high temperature of the shell.

### Blending and Storage

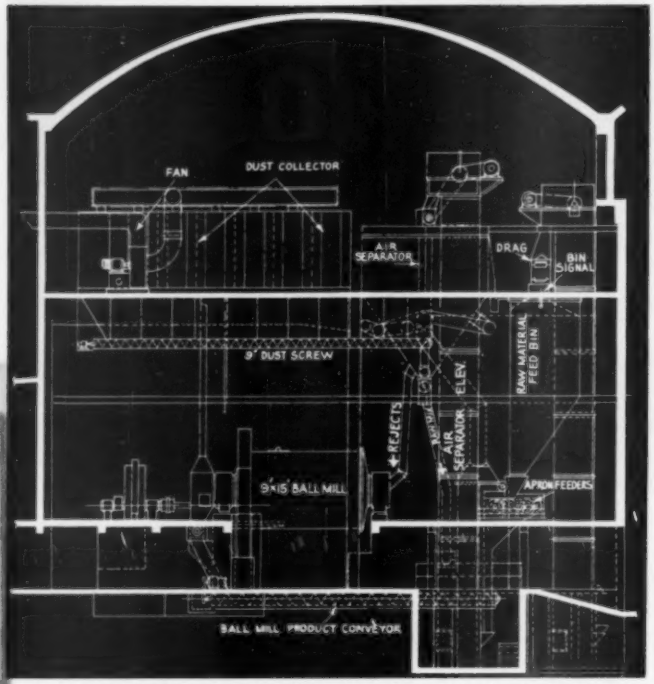
Raw materials from the mill are transported by F-K pump to the storage and blending silos which, as stated earlier, are conveniently located with respect to the feed ends of the kilns as well as the laboratory. It is important, for best operation of long dry process kilns, that blending facilities be adequate in capacity and have great flexibility through sufficient numbers of storage units. The system in this plant is as highly developed as any, having a capacity of 33,000 equivalent barrels in storage contained in 11 equally-sized 22- x 85-ft. silos. This is sufficient for seven days' kiln operation.







**(1) Limestone is hauled to primary crusher by side-dump semi-trailers. Discharge is on either side of primary crusher. (2) Primary crusher building showing a truck dumping. Dust collector is located in foreground. (3) Conveyor belt in secondary crushing building which delivers into covered storage. Note dust collector piping. (4) Dumping of limestone into primary crusher is a push-button controlled operation. Bag-type dust collector is on right**




**Sectional elevation through raw mill. The initial feed goes directly to the air separators, the separator tailings to the mill, and the mill discharge to a screw, which, again, feeds the elevator. The fines are conveyed by screw to a cement pump**

Storage is in two rows of four self-cleaning silos, with three interstice bins between, which serve as kiln feed storage for blended mix. Incoming raw material from the grinding mills is discharged into a Fuller alleviator at the top of the silos, which is vented through a Sly dust filter, thus minimizing dust through de-aeration before distribution into the respective silos. Dust is returned into the circuit. Screw conveyors are the means of filling the respective silos.

There are two parallel screw conveyors, each under a row of silos, to which material is fed for blending and transfer. Under each silo is a 16- x 27-in. Fuller variable speed rotary feeder. Definite proportions from two or more silos, as determined by the chemist, based on samples taken every 90 minutes, are fed to a screw conveyor. Each withdrawal screw conveyor transfers to a separate enclosed chain-bucket elevator and the stream is put back in any of the silos through distribution screw conveyors for re-blending or may be transferred into either of the three kiln feed storage bins.

Under each blended kiln feed silo there is a rotary feeder to regulate discharge into a screw conveyor delivering into a bucket elevator for transfer by screw conveyor into a 150-bbl. kiln feed bin.

With this system, raw mix for only one type of cement is stored in silos at any one time. When changing types, the large storage capacity and the flexibility of the storage system enable starting to grind a different mix several days before the previous mix has been depleted.

An interesting feature is that, because of the height, the bucket elevators were built in two sections rather than with a single elevator delivering to the top of 85-ft. silos. Lone Star's experience has been that maintenance problems multiply when bucket elevators are excessively high. Extra heavy-duty features are built into them. Each elevator has heavy-duty, single-strand chains and weighted gravity-type take-ups. Casings are of ¼-in. steel plate and heavy angle-iron construction. Tail shafts are stellited and bearings are of manganese steel. These construction details are standard practice in all the plants.

In the case of the elevators carrying kiln feed material, the split between elevators provides the flexibility of transferring the stream directly into a horizontal screw conveyor filling the 150-ton kiln feed bin or transferring to the second section for return overhead into the silos.

## Kiln Feed

Two separate kiln feed systems each consist of a rotary feeder drawing material from the 150-bbl. feed bin into circulating screw conveyors and elevators which deliver into constant-head feeders. The feeder, in each case, delivers from the tank into a circulating bucket elevator which returns the material into a feed box containing an overflow weir. A proportioning feed screw in the weir box is driven through an electrical synchronous tie, consisting of an a-c motor electrically connected to an a-c generator driven from the d-c kiln drive motor. The feed is delivered into a spout from which a short screw places it into the kiln.

With this system, constant rate of feed into the kilns is assured through keeping the feed screws full. Excess material not fed to the kiln by the feed screw overflows into the feed bin and is recirculated with the fresh feed coming from the raw mix silos.

Particular attention was paid to the introduction of kiln feed into the kiln to minimize dust losses. Material, as delivered from the constant head feeder, is spouted into a 12-in. cast-iron kiln feed screw projecting through the exhaust gas dust chamber into the kiln. The feed is introduced right on the load in the kiln, on the load side, so that the end of the pipe is not enveloped by the gases. This is in contrast to the more conventional practice where feed enters a kiln at high velocity through an inclined feed pipe. Dust from the kiln feed chambers and also from the mechanical stack dust collectors is returned by screw conveyors into the circulating stream bucket elevator.

## Kilns

Clinker production is rated at 2000 bbl. per day from each of two 10- x

**A railroad had to be built to the plant site and many thousands of tons of rock and shale were excavated preliminary to building. Through this railroad bridge may be seen the bulk cement loading silos on right, and the main bank of silos (under construction)**

340-ft. Allis-Chalmers five-support welded rotary kilns. They are direct fired with pulverized coal and discharge to air-quenching clinker coolers. The kilns are exposed except for about 75 ft. at the burning zone end. The installation is one of the cleanest and most efficient yet seen from the standpoint of neatness and utility. The kiln hoods are streamlined, the drives are clean-cut and smooth, and the cooler and coal mill room is spacious and immaculately clean.

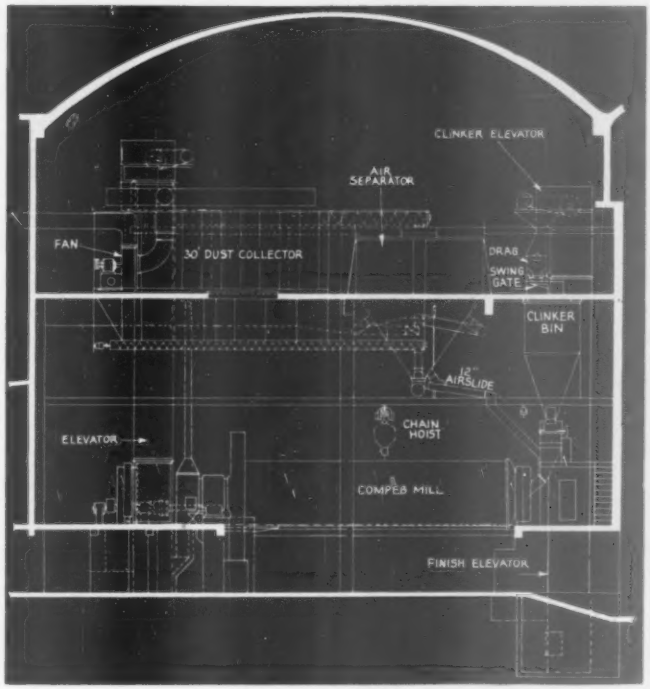
The kilns ride on water-cooled rollers, have a 7/16-in. pitch, and each is driven by 75/100-hp. Allis-Chalmers 400/1200-r.p.m., 230-volt adjustable speed d-c motors, with shunt field control through a Falk helical gear reducer followed by cut helical-bull pinion and ring gear. Speed range is from 28 to 84 r.p.h. An auxiliary gas engine is provided for emergency in event of power failure, with speed reduction through a Falk gear reducer and a clutch to engage the motor shaft. Alternating current generators driven from the kiln motors are electrically connected to the constant head feed screw drives.

Kilns are lined with 6-in. brick throughout their lengths, and do not have insulation. A 70 percent alumina brick is used in the hot zone, followed by 40 percent alumina brick. Firing hoods and dust chambers are lined with A. P. Green castable refractories and are insulated to hold down heat radiation in these operating areas. Kiln feed openings are restricted for improved draft control and the nose rings are air-cooled to keep the castings from overheating, flaring out and breaking. Hoods are tight-fitting to minimize air leakage fluctuations and thereby contribute to more controlled firing conditions.

## Coal Mills

Coal for firing the kilns is a 1-in. West Virginia slack, which is a low sulfur, high fusion and low ash fuel with a heat rating of 14,000 B.t.u. per lb. It is drawn from adjoining storage by screw conveyor and elevated into either of two 50-ton overhead coal mill feed bins. Bin level devices

Screw conveyors are used for distribution of raw materials and cement into silos. Materials are pumped into alleviator and then fed into silos from screw conveyors like this



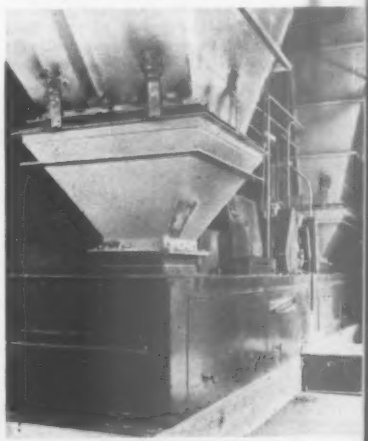

Section through finish mill

indicate to the operator the levels in the bins. Raymond No. 473A direct-firing bowl mills on the level below the firing floor are fed coal through independent roll-type feeders on the floor above. Each mill is driven by a 150-hp., 1200-r.p.m. motor. Primary air is drawn from the clinker cooler at 350-400 deg. F., and first put through a Multiclone collector to remove clinker dust which is returned into the system. A coal mill temperature controller automatically maintains the temperature of the air-coal stream into the kiln at 180 deg. F. The burner pipe is 9 in. diameter and is water-cooled.

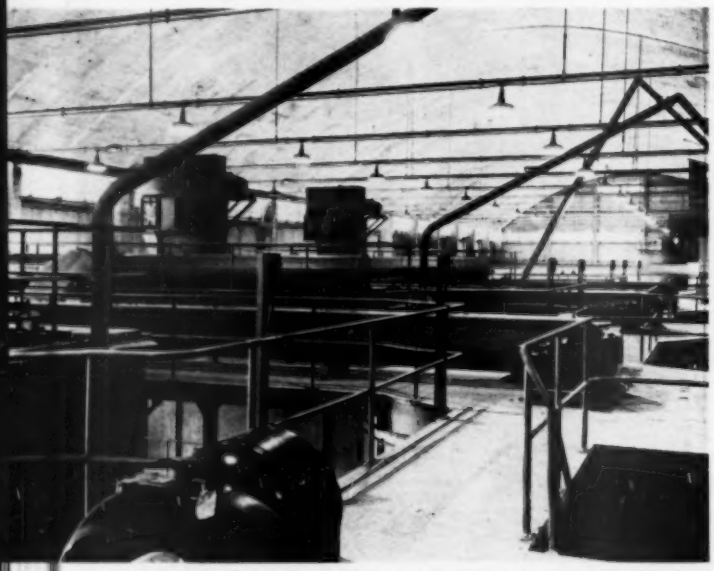
## Clinker Coolers

Clinker is discharged from each kiln into a 6- x 33-ft. inclined-grate, air-quenching Fuller cooler on the floor below. Each cooler is mounted one foot off the center line of the kiln on the load side for even distribution of clinker over the width of the grate. Each has a greater capacity than ordinary for the load carried, to insure a thoroughly cooled clinker (150 deg. F.) and because the primary air put through the coal mill is drawn from the cooler rather than from the kiln hood, the air velocity through the hood is minimized.

Cooling air is forced through the bed by a New York Blower Co. fan driven by a 50-hp. motor. Excess air from the cooler is vented through a Multiclone cyclone-type dust collector and Norblo fan to the atmosphere. Chunks of clinker are broken up through a hammermill-type clinker breaker at the discharge end of the cooler. The clinker breaker is of Lone



Two of the feeding devices which proportion raw materials from separate bins for conveying to raw grinding mill circuits



This view, upstairs in mill room, shows tops of bag type dust collectors, and elevator heads and screw conveyors for feed to air separators. Note roof of thin concrete shell construction and V-shaped pipe to prevent dust settling in them

Star design and is similar to the types recently installed in the company's other mills. A description of the breaker as used at the Dallas, Texas, mill was described in ROCK PRODUCTS, August, 1949, pages 146-151.

In each case, a drag chain conveyor transfers to a 65-ft. bucket elevator from which the clinker is put over a 3- x 6-ft. single-deck Allis-Chalmers Aerovibe vibrating screen which is in closed circuit with an Allis-Chalmers No. 330 Hydrocone clinker crusher. The screen carries ⅝-in. wire cloth; the oversize is returned into the elevator feeding the screen and the fines are conveyed over a 24-in. belt conveyor, on 120-ft. centers, into the clinker section of the storage building. A Sly dust filter vents the elevators, screens and clinker crushers.

## Kiln Operations

In operating the kilns, the speed of rotation is set since, in running long dry process kilns, it has been proved necessary to have constant speed control and to avoid major fluctuations. Adjustments are made as required by varying the fuel rate and the kiln speed is changed only when heat requirements must be adjusted in the range of 10 percent or more.

Firing is in the 2700-2800 deg. F. range in the hot zone as measured by radiamatic pyrometer which measures the temperature on the lining, and the exit gas temperature at entrance into the dust chamber is 1100-1300 deg. F. Primary air represents about 30 percent of the combustion air and is drawn from the cooler at a point where the temperature is 400-450 deg. F. This is preferred to drawing the primary air from the kiln hood, as done in nearly all plants, in order not to draw combustibles out of the kiln hood, which reduces the oxygen in the primary air. Another reason is to eliminate much of the fogging at the hood which reduces visibility.

Tempering air is introduced into the primary air stream, through action of the temperature controller, to hold the temperature of the coal-air mixture at 180 deg. F. into the kiln. This tempering air will be admitted between the cooler and the clinker dust Multiclone in order not to affect the fan characteristics of the coal mill.

Secondary air is preheated air from the clinker cooler, introduced into the kiln at 1200-1500 deg. F. as measured by a pyrometer in the cooler. The throat opening between the cooler and the kiln hood was designed as large as the hood to keep velocities at a minimum, otherwise there would be fogging due to dust pick up. It is expected to produce clinker at a fuel rate of 900,000 to 950,000 B.t.u. per bbl.

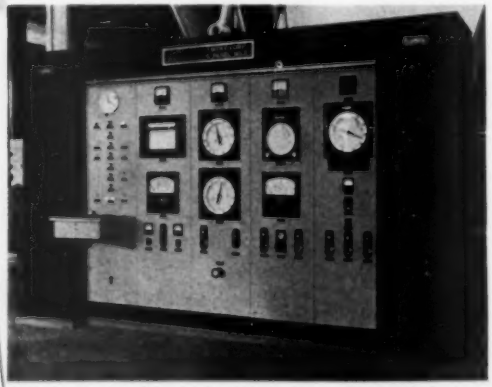
## Instrumentation—Controls

These kilns are not as highly instrumentalized as many of the newer installations in the industry and the instruments used are only those considered as absolutely essential. Each kiln has a separate control board for its instruments. Instruments are as follows:

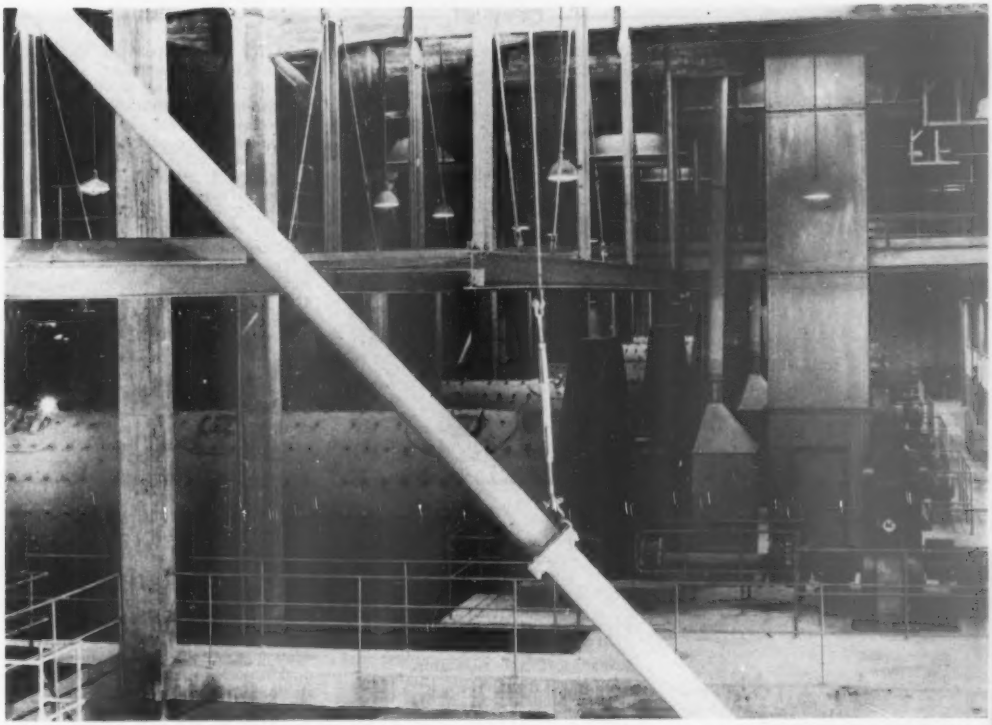
Brown tachometer recorder for kiln speed.

Brown radiamatic pyrometer clinker temperature recorder.

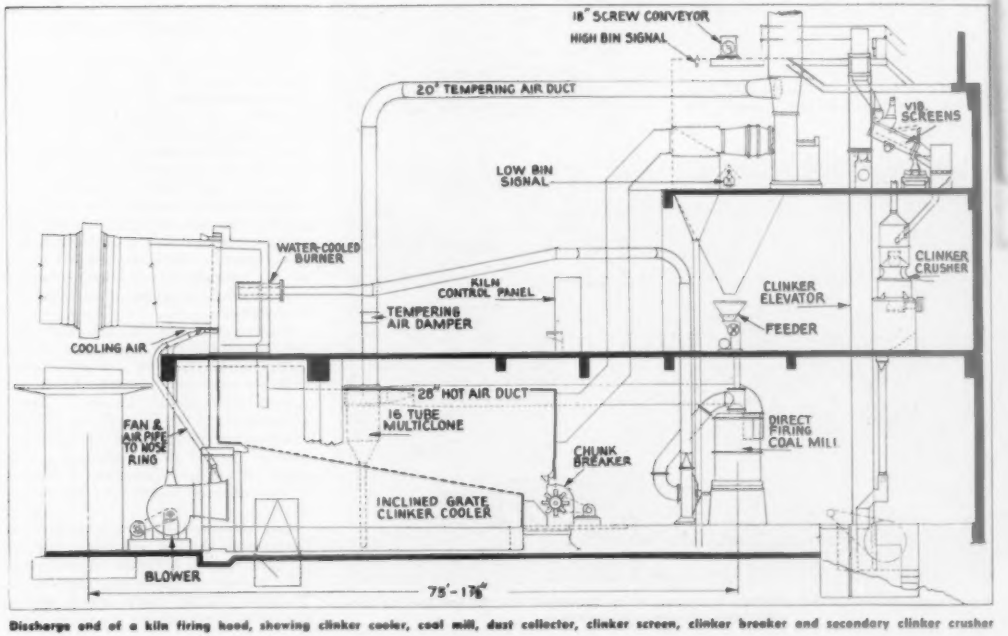
Brown pyrometer 2-pen recorder



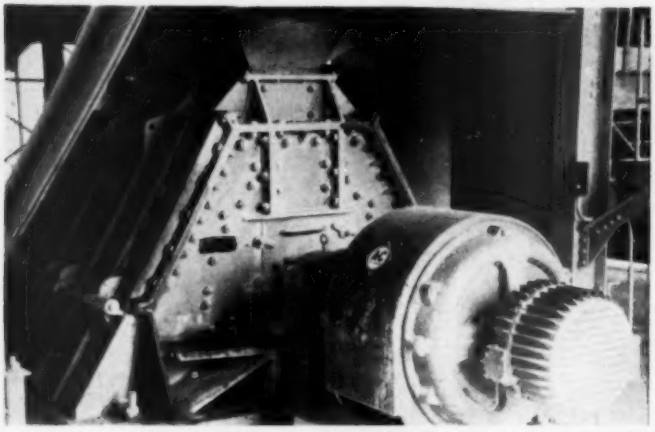
Left: One of two kiln control panels; manual and automatic controls are provided for optional use by burners. Right: One of two inclined grate clinker coolers below kilns. Clinker breaker in front is to crush chunks of clinker. Note roominess, cleanliness and protection devices for plant personnel



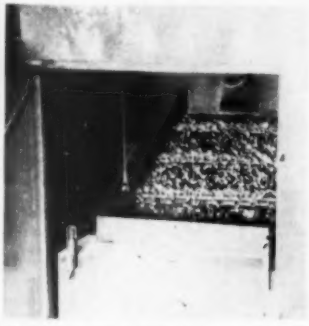
This view in mill room shows the three finish mills in foreground and the two raw mills in background. Main electrical switchgear is in room adjoining on right. Extensive use of concrete was made throughout in construction of entire plant, as seen here, and cleanliness and roominess around equipment was emphasized. Note guard rails and dust collectors on floor above




Discharge end of a kiln firing hood, showing clinker cooler, coal mill, dust collector, clinker screen, clinker breaker and secondary clinker crusher



Hammermill-type crusher is in closed circuit with vibrating screens in crusher building to enable delivery of closely-sized material to mill



Vibrating screens in secondary crushing building are housed in an enclosure to control dust

for kiln exhaust gases and the dust collector inlet temperature.

Brown recorder and controller for the clinker cooler bed-speed.

Brown coal mill temperature recorder and controller.

Hagan coal mill regulator.

Hays draft gauges.

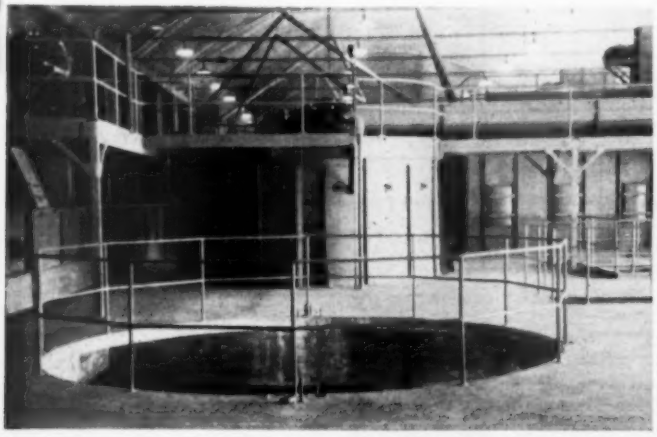
Weston ammeters.

There are indicating lights on the board to keep the burner informed of all operations from the point of kiln feed through to the placing of clinker into storage.

There is no continuous gas analyzer in use but Orsat analyses are taken at regular intervals. However, the 2-pen pyrometer recorder, for the kiln exhaust gases and the dust collector inlet temperature, is being used for the purpose of indicating excess air or insufficient air. Temperature of the gases leaving the kiln will go higher if combustibles are present, when tempering air is bled into the system at entrance to the electrical precipitator. Similarly, the second pen will indicate secondary combustion in event there is starvation of oxygen. Thus, the amount of tempering air can be regulated to hold a predetermined exit gas temperature.

The radiamatic pyrometer is pointed on the lining in the burning zone. The coal mill temperature recorder controller is one of few automatic instruments in regular use. It regulates the amount of air bled into the heated air stream before it enters the mill, through a pressurized diaphragm. The cooler bed speed indicator and controller may be used for automatic or manual regulation of the clinker grate speed.

Instruments, in general, may be used for either automatic or manual control, depending upon the wishes of the burner. They are there to use when it is to his advantage. Manual controls are adjusted by remote controls through gear-type regulators.



One of air separators in mill building. Note guard railing throughout and the provision for later installation of another air separator

## Stack Collectors

Exhaust gases from the kilns are drawn, first, through a mechanical dust collector and then an electrostatic precipitator, which combination gives a very high collection efficiency. Thus, the bulk of the dust can be returned into the circulating kiln feed system while the small fraction, in the extremely fine size ranges, may be wasted if necessary. The finished product has less than 0.5 percent total alkalies.

Each kiln has an annular opening between the kiln and dust chamber and exhausts into a rectangular dust chamber with 45 deg. hoppered bottoms from which collected dust is returned continuously into the circulating kiln feed system by screw conveyor. Air is bled in to reduce the gas temperature to 600-700 deg. F. as the gases enter the primary mechanical collector, which is a 6-unit Buell cyclone collector rated at 100,000 c.f.m. at this temperature. Dust collected here is that returned into the kiln feed system.

Gases exhausted from the mechanical collector at 600 deg. F. are drawn through a Koppers "Elex" twin-chamber electrical precipitator of the rod-curtain, pocket electrode type, also rated at 100,000 c.f.m. Either chamber can be isolated for the purpose of repair or maintenance. The precipitators are thermally insulated to minimize corrosion and condensation.

The dust collectors are duplicated for each of the two kilns and exhaust is through individual Prat-Daniel 100-ft. venturi-type self-supporting Thermix stacks. Each stack has a size 155 Thermix fan complete with

louvre-damper, which is driven through V-belt by a 200-hp., 720-r.p.m., 440-volt motor. Static pressure drop through the combination of dust collectors is 3½- to 4-in. water gauge.

### Finish Grinding

Clinker is ground through three separate circuits consisting of an Allis-Chalmers 8- x 32-ft. compartment mill in closed circuit with a 16-ft. mechanical air separator. Clinker and gypsum are placed into separate live storage bins by the overhead cranes. One bin is for gypsum and two (1650 bbl.) for clinker. One clinker bin may alternatively be used for limestone when manufacturing masonry cement.

Arrangement for transfer into the mill building is similar to that in the raw end, except that there are three Merrick Feedoweights to proportion materials Feedoweights to proportion Proportioned clinker and gypsum are transported by a drag chain conveyor to a bucket elevator, and drag conveyors transfer the elevator stream into either of three 60-bbl. finish mill feed bins. Capacity of the bins is held to 60 bbl. to minimize segregation.

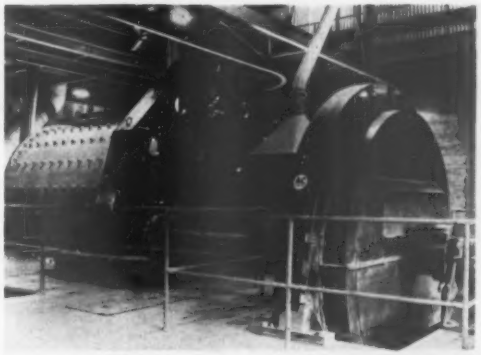
An 18-in. x 4-ft. Chain Belt apron feeder regulates the flow into each grinding mill. The mills are 2-compartment Compeb mills. Each is driven by an 800-hp., 180-r.p.m., 4160-volt synchronous motor through an Amerigear floating shaft coupling. The drive is designed for 80 percent leading power factor to improve total power factor. Linings are of Lorain-type hardened steel plates and the loading carried is 130,000 lb. of 3½- to ⅝-in. forged steel balls.

Air separators have similar top deck insulation and 100-hp. drives to those in the raw mill. A special inlet admits cooling air to the separator which is exhausted through a 30-ft. Norblo dust filter and fan. The separators have 60 auxiliary blades instead of the conventional 48 which enables more accurate adjustments without throwing them out of balance.

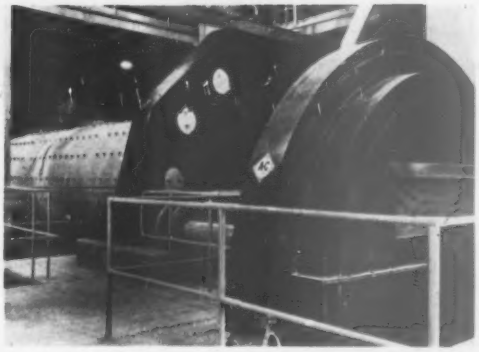
Mill discharge is elevated and fed to the air separator by screw conveyor and the rejects are returned into the mill by a Fuller-Huron airslide.

The 30-ft. dust filters are standard units with a classifying chamber on the inlet side. Cooling by pulling air at room temperature through the air separator has proved effective at several of the Lone Star plants and has several advantages. Grinding mill efficiency is increased and the finished product coming out of the circuit is cooled to a temperature of 125 deg. F. to 150 deg. F.

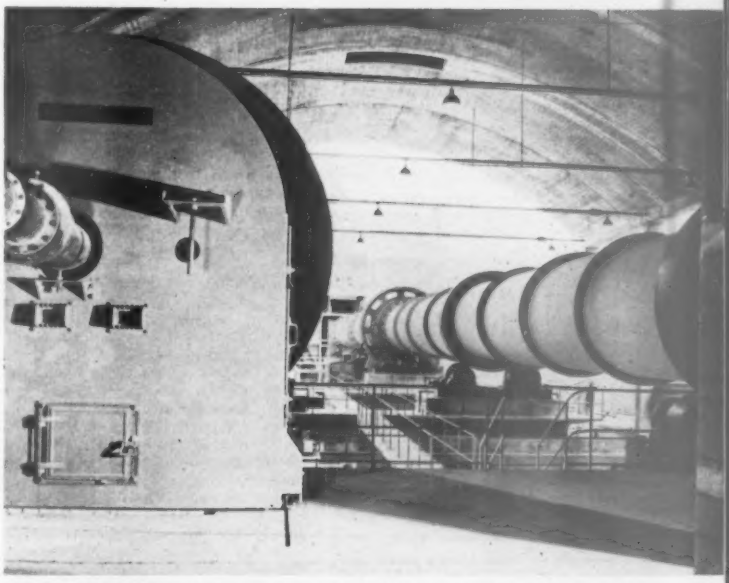
A further advantage is that when a separator must be pulled out of the line for maintenance, by operating the dust filter after the feed is stopped, a man can enter the separator to work after only 15 or 20 minutes. By drawing air in considerable volume through the air separators, the entire mill



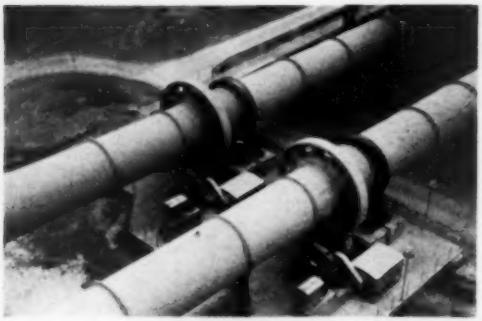
One of two raw grinding mills showing drive. Dust collector may be seen above, and on left, piping for heated air introduced into mechanical air separator. Note how motor is enclosed



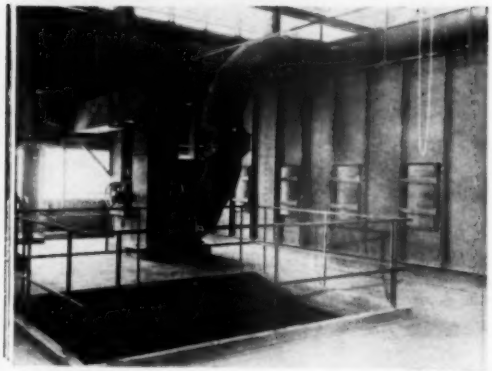
One of finish mills. There are three similar units each in closed circuit with a mechanical air separator. Note how motor is enclosed here also



Two 10- x 340-ft. all-welded dry process kilns are direct fired by coal and each has a rated production of 2000 bbl. of clinker per day. View is toward feed end; air-quenching clinker coolers are on floor below under firing ends



Kiln drives are unusually smooth in operation. Auxiliary gasoline engines were provided for emergency

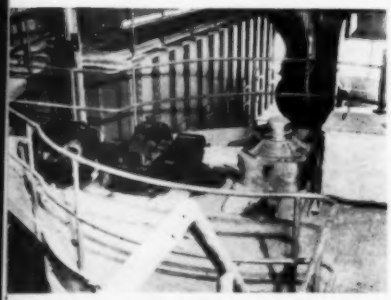


One of battery of bag-type dust collectors in mill room, showing exhaust fan. Each grinding circuit has an individual collector

room is placed under a slight negative pressure which helps keep the atmosphere clean. As stated earlier, there are very few windows and louvres are the means to provide ventilation.

Capacity of each grinding mill circuit is approximately 100 bbl. per hr. Two mills are more than sufficient to keep pace with the kilns. The third is there for grinding high early strength cement, or masonry cement, and provides reserve capacity.

Fines from the air separators and from the dust collectors (cement) are conveyed by screw conveyor into the hopper of an 8-in. Fuller type H cement pump for transport to the finished cement silos. The pump is driven by a 100-hp. motor and is supplied air by a Fuller C-250 air compressor driven by a 150-hp. motor.



An interesting operating detail is shown here. All air separators have their tops insulated and decked over for improved working conditions. Positive gear drives are used to guard against slippage

## Cement Storage

Cement is transported from the cement pump in the finished mill into an alleviator on top of the main bank of silos, which is vented through a Sly bag-type dust arrestor. A branch line is run to a separate bank of silos for bulk loading. Distribution into the various silos is by screw conveyors.

The main silo structure consists of two parallel rows of five self-cleaning silos, each 26- x 110-ft., holding a total of 130,000 bbl. of cement. Two are exclusively for masonry cement. The interstices are not used and serve merely to ventilate the basement of the structure. Cement is drawn from the various silos and fed into the hoppers of rail-mounted 7-in. Fuller-Kinyon pumps by airslides. There are two of these pumps, one under each row of silos, each driven by 100-hp. motors, and individual size 250 Fuller rotary air compressors supply the air requirements at 35 p.s.i. Air inlets are provided through the hoppered bottoms to facilitate flow if required. Masonry cement is transported to the adjoining packhouse by an entirely separate screw conveyor and bucket elevator as a safeguard against contamination.

There are five bulk silos of the same size which have a single 7-in. portable Fuller-Kinyon pump for transfer between silos. Incoming cement is first put through an alleviator which is vented by a Sly dust arrestor, like in the main structure, and screw conveyors are the means of distribution. Bulk cement cars are loaded by spouts through the sides of the silos. A dribble bin and track scale are being provided to enable loading cars to exact weight. Cement will be pumped through an alleviator, vented by a dust filter, into this bin.

## Packhouse

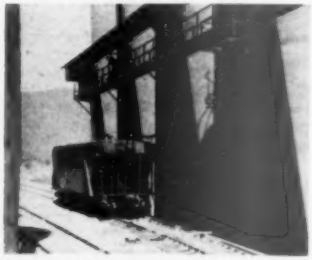
Packing is done in a packhouse practically identical to those built several years ago at the Birmingham, Ala., and Dallas, Texas, plants and which were described at the time in ROCK PRODUCTS as setting a new pattern for plant cleanliness and flexibility of operations. Of outstanding interest is that the design removes all chance of contamination when switching over from the packing of one type of cement to another.

Operation of the packhouse is only briefly described herein, for full details are available from ROCK PRODUCTS, September, 1948, issue, pages 82-87.

Incoming cement from the silos is put through an alleviator, vented through a Sly dust arrestor, and into a 150-bbl. steel tank for each of four St. Regis 4-tube type 150C valve-bagging machines. There are three packer stations with two machines at one station, for packing masonry cement (one machine) and any other type; at the other stations all but masonry cement may be packed

In each case, the storage tank has Bin-dicators which control the pump supplying cement from the silos. A Fuller-Huron feeder regulates the flow of cement from this circulating tank into a screw conveyor and a bucket elevator and screw conveyor transfer the cement into an overhead 150-ton packer feed bin. Bin-dicators are also the means of control of flow from the circulating tank.

Each packing machine has a capacity between 1000 and 1200 bags



Five separate silos were built for bulk loading of cars. Inside the silos are hoppered bottoms

per hr. Spillage from the packers drops into recirculating screw conveyors and each machine discharges bags on to a reversible wire mesh conveyor for loading into cars on either side of the building. Three-man crews at each station load bags into cars, using hand trucks.

Adjoining is a 2-story building where bags are stored and from which bales of bags are elevated and trucked to chutes. Incoming bags will be palletized and handled by power lift trucks. The floors and equipment are kept spotlessly clean by a Lamson Corp. vacuum cleaning system operating in connection with a number of vacuum hose connections throughout the building.

### Electrical Power

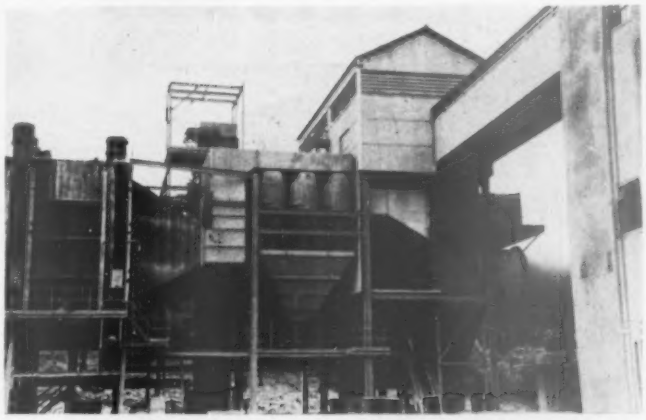
Electrical power is purchased from the Appalachian Electric Power Co. and is delivered at 33,000 volts to two company-owned 3750 kv.-a. Allis-Chalmers single circuit unit substations where the potential is reduced to 4160 volts. All main electrical distribution equipment is concentrated in a leanto adjacent to the grinding mill building and an Allis-Chalmers metal-clad, vertical lift switchboard distributes power at 4160 volts to seven G.E. 4160/480 volt unit substations. The main switchboard room is ventilated and kept free from dust.

Transmission is through underground Transite ducts with convenient manholes. All steel conduit is hidden. The main switchboard also includes starting and inching equipment for the two 700-hp. raw mill motors, the three 800-hp. finish mill drives and two 250-kw. 250-volt motor-generator sets serving the d-c requirements of the plant.

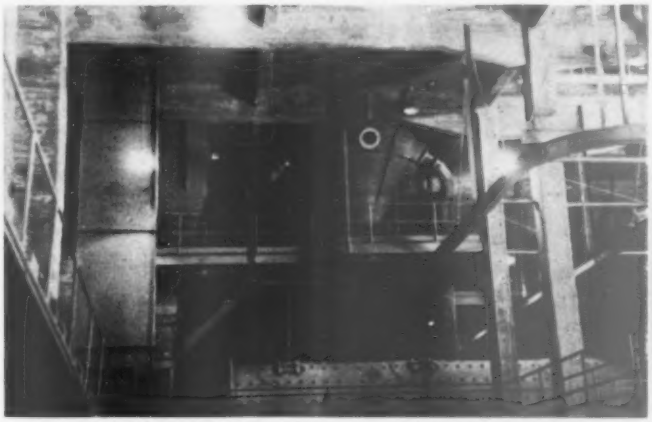
The seven substations comprise a 500 kv.-a. unit serving the quarry and crushing building, 750 kv.-a. for the raw mill, 750 kv.-a. for the raw silos and dust collector, 750 kv.-a. for the coal grinding and cooler building; 750 kv.-a. for the finish mill and cranes, 750 kv.-a. for the packhouse and silos and 150 kv.-a. for the office and shops. All motors over 200 hp. are supplied current at 4160 volts and all others at 440 volts. Connected power is 6000 installed horsepower and the daily power requirement is 75,000 kw.-hr.

All of the motors in excess of 300 hp., wound for 4000 volts, are of Allis-Chalmers manufacture. The motors below 300 hp. are wound for 440 volts and were supplied by G. E. G. E. also supplied the gear motors up to about 25 hp. Herringbone-type reducers and couplings for drives of 30 hp. and greater were supplied by Falk. All small adjustable-speed equipment such as the Fuller rotary feeders and apron feeders are driven by U. S. vari-drive syncrogear motors.

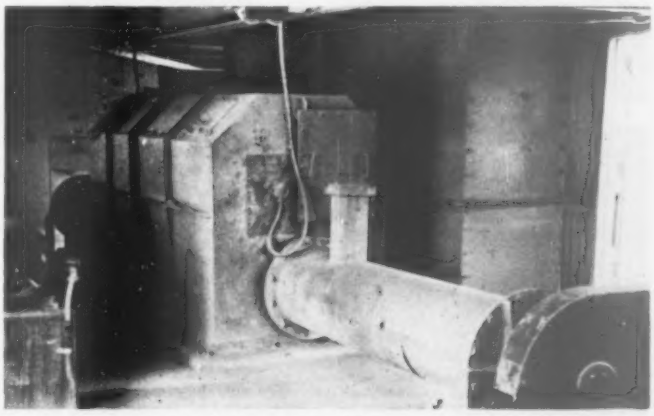
All of the 440-volt motors, 100 hp. and larger, are started from the G. E.



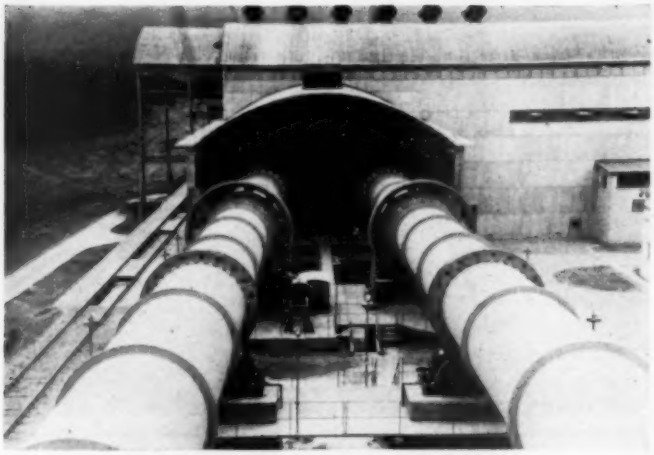
Feed ends of kilns. Overhead conveyor is from blending bins to kiln feeders. Dust from cyclone collectors is returned into kilns; that from electrical precipitators on left is wasted



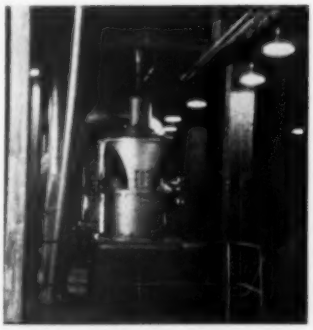
Air separators in finish mill have cool air drawn through as shown here, venting through dust filter



Kilns are fed uniformly by individual constant head feeders using a circulating stream with overflow



Kilns shown from feed ends looking toward firing ends



Each of the kilns is fired by a direct firing unit coal mill

One of hot air furnaces for supplying heated air into air separator in raw grinding circuit

substations, and the 440-volt motors, 75 hp. and smaller, are started from multi-unit type control centers fabricated by Metropolitan Electric Manufacturing Co. and equipped with Allen-Bradley starters.

Alternating current motors are full-voltage across-the-line start type with the exception of the 200-hp. motor on the gyratory primary crusher which is a wound rotor motor.

Kiln feed from overhead constant head feeder is introduced through dust chamber right onto load inside kiln, by this short screw conveyor, to minimize dust

## Equipment (General)

Most of the major equipment, as detailed through this article, including major electrical equipment, was supplied by Allis-Chalmers Manufacturing Co. General Electric Co. furnished 440 v. unit substations and the 440 volt motors and generators. Fuller Co. furnished the clinker coolers, air feeders, material pumps, compressors, etc. Screw conveyors and related equipment are Link-Belt, and Kensington Steel Co. supplied the drag chains and elevator chains. Apron feeders, belt conveyor idlers, pulleys and the drive chain and sprockets for the elevators are Chain Belt Co. manufacture. Goodyear and Republic belting are used throughout.

## Credits—Officials

The operating and engineering departments of Lone Star Cement Corp., under the direction of executive vice-president Th. Avnsoe; vice-president in charge of engineering and purchasing, E. Posselt; and chief engineer C. C. Van Zandt designed the plant with the cooperation of the engineering staffs of the equipment manufacturers and the contractors.

Walsh Construction Co., and The Ralph E. Mills Co. were contractors for the project. MacDonald Engineering Co. prepared the design details and supervised erection of the silos and packhouse. Austin Co. designed the office, laboratory and service buildings and The Roberts & Schaefer Co. developed the details of the large concrete mill, storage and kiln buildings.

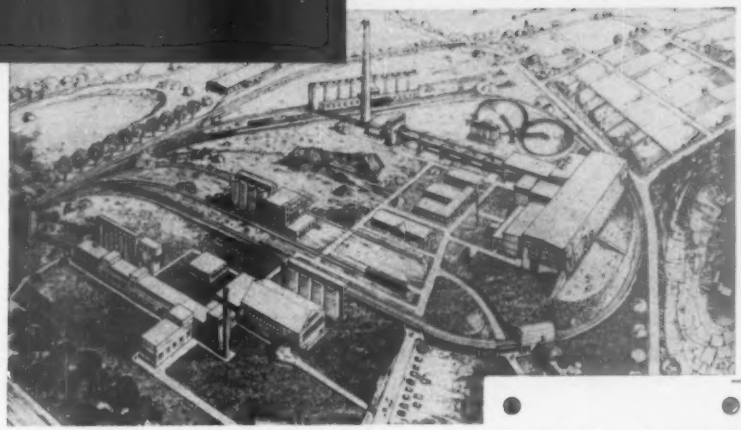
Construction and installation were under the direct supervision of Herman Ursprung, project manager, who is now domestic manager for all of Lone Star's U. S. plants. Stewart S. Fritts was project field engineer and is now general superintendent, and Einer Anderson was construction superintendent.

The plant is under the supervision of Roy A. Rasmussen, plant superintendent. W. J. Kendrick, Jr., is chief chemist and Homer C. Shick is plant chief clerk.

R. A. Hummel is president of Lone Star Cement Corp. with offices in New York and Dwight Morgan is vice-president of the Virginia division with offices in Richmond, Va.

Main electrical switchgear is centered in this leanto adjoining mill building. A slight suction is maintained in room to keep it dust free

Battery of bag-type dust collectors in mill building. Each grinding circuit has an individual dust collector



How new plant will look after the old one is removed

By
**L. A. WAGNER***

**Among New or Improved Design Features**

Controlled Sized Feed for all Mills
Single Stage Raw Grinding
Open Circuit Clinker Grinding
Air Conditioned Crane Cabs
Fringe Tanks for Reprocessing
Mixed Types of Cement
Roll Crusher Chunk Breakers following Clinker Coolers
Slurry Pumps with Grease Seals
Slurry Distributor to Replace a Maze of Valves
Improved Precipitator Dust Return System
Kiln Hoods with Removable Fronts

IMMEDIATELY FOLLOWING World War II the Missouri Portland Cement Co. embarked upon a modernization program with the ultimate objective of completely modernizing its manufacturing and distributing facilities at St. Louis, Kansas City and Memphis. The first construction was done at Memphis where new silos and packing facilities were built and these, together with docks at both St. Louis and Memphis, have been previously described in ROCK PRODUCTS, August, 1947, and *Pit and Quarry*, October, 1947. The next step was the complete rebuilding of 400 t.p.h. quarrying and crushing facilities at Ft. Bellefontaine which serves the St. Louis cement plant. These were described in the July, 1949, issue of *Pit and Quarry*.

The next step was the building of a new 6500 bbl./day cement plant at St. Louis, which is the subject of this article. Prior to this new plant, the existing plant at St. Louis had grown by the process of adding a department here and a department there which always results in a compromise and prevents fullest use of technical advancements. In the new plant this policy was abandoned and complete new facilities from the quarry straight through to the cement pumps were designed and built. As the packing department had been rebuilt just prior to World War II, the new plant completed the chain of new facilities.

The Missouri Portland Cement Co. has been by tradition a "city operator." With plants adjacent to Kansas City and St. Louis, and a shipping terminal at Memphis, the company's shipments all originate at market centers. This answers the query which is often raised as to why the new St. Louis plant was not located at the quarry site, which is 9 miles north of the plant, and, of course, outside of the St. Louis switching district.

The crushed rock from the quarry comes into the plant in standard 70-ton hopper cars, and since coal, gypsum and iron ore come by hopper cars this plant is not only a "city plant" but in the writer's terminology is also a "railroad plant." Thus it became important to modernize the track facilities, which was done by building a belt line around the plant with a modern car unloading station through which the incoming cars might pass and be efficiently unloaded. The unloading station is equipped with a Robins car shakeout and a steel track hopper of 140 tons capacity with 57 deg. slope which empties cleanly from one material to another. A Syntron vibrating feeder placed beneath the hopper delivers the stone, iron ore, coal or gypsum to a conveyor belt which carries it to the crane storage building. The delivery rate of the vibrating feeder is dial controlled, which makes it easy for the operator always to keep a full load upon the belt. From past experience it was found that where gate feeders alone were relied upon, the operator would close the gate down to keep the fastest running material from overflowing the belt and then when slower running materials were being handled the gate would not be opened up to keep the belt full. By providing the operator with a dial control it is so easy to adjust the feed rate to the belt that a full load is generally kept upon it.

### Storage Building

The storage building is 400 ft. long and 100 ft. between crane rails. It is conventional in that the tripper belt unloads the incoming materials along one of the long walls and the various mill feed bins are located along the opposite wall. The storage building is somewhat unique in that it is fully partitioned. That is, the spaces for limestone, shale, iron ore, gypsum, coal, and three kinds of clinker were decided upon ahead of time and partitions were built in to accommodate these materials. This means that contamination with one material in another is eliminated and also allows the

**AUTHOR'S NOTE**

**The author wishes to state that no claim is made for originality in the design of this new plant. One of the fine traditions of the portland cement industry is its free exchange of ideas, and many of the features described are adaptations or improvements of something.**

*Director of engineering and research, Missouri Portland Cement Co., St. Louis, Mo.

Interior of storage building which is enclosed to confine dust. Conditioned and filtered air is supplied crane operator

storage spaces to be filled to greater depth. Because of this greater depth the cranes were designed with higher speed hoist motors than are ordinarily used.

There are two bridge cranes, each equipped with 5-cu. yd. clamshell buckets. The building was purposely constructed with no doors, windows or other open areas because it was desired to keep all dust inside the building. In order for the crane operator to work in these conditions it was necessary to air-condition the cabs of the cranes. This was done with both air filtration and refrigeration. The cranes were built by Harnischfeger and are powered by alternating current.

The tripper belt mechanism is Chain Belt and the power for moving it comes from the belt itself. This type of motion has proved very satisfactory and is free from the electrical hazard of the trolley wire where the traveling motion is provided by an electric motor. An interesting feature is the handling of the spill from the belt. In previous installations there has always been the problem of whether or not to put the belt inside the storage wall so that the spill will go into the bins. But this has the disadvantage of having the belt in the way of the crane bucket where it is frequently damaged. The alternative is to put the belt outside the crane wall but in this case the spill falls outside the wall where clean-up is a problem. In the diagrammatic sketch (Fig. 1) it can be seen how the belt was placed outside the wall but provisions made so that the spill goes back into the bins. This arrangement was made possible by placing the wind bracing struts all on one side of the structure, which gave room for the belt to be located between the batter columns and the vertical columns of the building wall. The capacity of the tripper belt is 800 t.p.h.

## Raw Grinding

The main burden of raw grinding is carried by two 10-ft. 8-in. x 17-ft. single-stage Nordberg mills, each close circuited with a Dorr rake and bowl classifier. Each of these units was designed for a capacity of 57.5 t.p.h. at 88 percent passing the 200-mesh sieve. In actual performance they have shown that they will substantially exceed this capacity and with closed-circuit grinding in which no oversize particles reach the kiln feed, it has been found that the fineness can be dropped to about 83 percent with no impairment to burning conditions. In summation, this means that these mills have been found to have a usable capacity of about 75 t.p.h. each.

The feed to all mills is controlled by Merrick Feedoweights. Each Feedoweight is driven by its own m-g set, and is also connected with a dial indicator on the feed instrument panel which is calibrated in tons per hour of the component being handled. The feeder system is checked at intervals with a Strob-o-tac and is found to be very reliable. Thus at last there is fingertip control for the feed of a mill and if a change as small as one ton per hour is desired, say from 65 to 66, it can be accomplished by movement of the dial.

The Nordberg mills are driven by 1000-hp. Electric Machinery synchronous motors with across-the-line starting. All mills are provided with inchers for spotting of manholes or other maintenance operations.

The overflow from the classifiers is pumped to two thickeners which are operated in parallel, one having a diameter of 180 ft. and the other of 200 ft. Property limitations prevented the thickeners from being the same size.

In observing other cement plants where closed-circuit raw grinding is used, it was found that frequently it is desirable to grind small amounts of special materials and keep these special materials separate from the thickeners. To accomplish this a 20-39 Unidan mill of 600 hp. was installed for open-circuit grinding. The system of mix control is to carry a basic mix of Type I composition in the thickeners and then carry an inventory of open-circuit ground correctives to convert the basic mix from

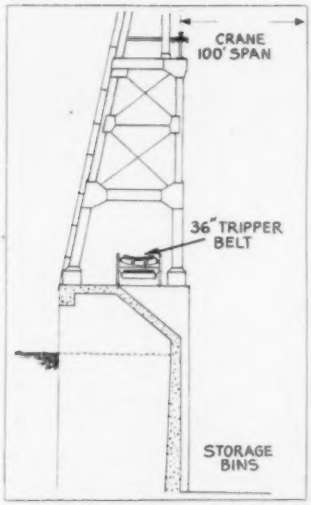



Fig. 1: Tripper belt in storage building

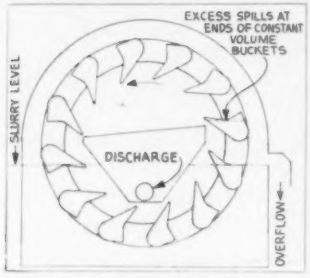



Fig. 2: Ferris wheel feeder

the thickeners into any composition desired. These correctives may consist of high lime slurry, high iron slurry, high silica slurry, etc.

## Blending Basins

There are eight blending basins of 20 ft. diameter and 34 ft. 6 in. high. Each basin is provided with revolving arms for horizontal agitation and compressed air for vertical agitation. The revolving agitators have Dorr drives with compressed air being supplied through the center shaft to the bottom of the basin. Two stationary air lines along the side of each basin also provide additional air. The bottoms of the basins are hoppered with a 30 deg. slope and have been found to be completely self-emptying. All pumps are of Morris type R with grease seals instead of water seals. This means that a small amount of grease is fed to the seals continuously through a system developed in earlier installations at this plant. This type of pump has the advantage of creating a vacuum on the intake side which assists materially in complete emptying of the basins.

On top of the basins an ingenious type of slurry distribution system was worked out through a system of launders and spouts which revolve through Chicsan joints. A little study of the photograph of this slurry distributor will make obvious what a tangle of valves and pipes it replaces. After final correction the slurry is pumped to a kiln feed basin of 6000 bbl. capacity.

## Slurry Feeders

Slurry is fed to the kilns by ferris wheel feeders which are synchronized with kiln speed by the conventional Ward-Leonard system. There is no provision for varying the ratio of slurry delivered per kiln revolution except by adding on or taking off buckets from the ferris wheel. This system was employed purposely because it was desired to prevent easy or frequent changes in this ratio. Study was given to the shape of the buckets in order to improve their constancy of delivery for various speeds of the ferris wheel feeder and for different consistency of slurry. The design adopted is shown in Fig. 2. Tests made since the feeders have been in operation show that they deliver a constant amount per bucket within 2 percent throughout the range of speeds and slurry consistency encountered in normal operation.

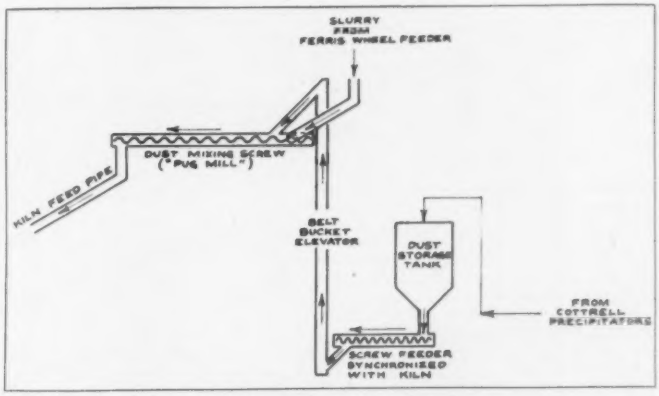



Fig. 3: Dust return system to kiln feed

Tripper belt showing hoppered floor to carry spill back to bins

## Dust Return System

Return of dust from the Cottrell precipitator is always a problem and through experimental work done at this same plant with an earlier Cottrell the system shown in Fig. 3 was perfected and installed. In this system the dust is stored in a steel bin and is fed out the bottom through double screw feeders which are also tied into the Ward-Leonard kiln drive system. In opposition to the slurry feeders,

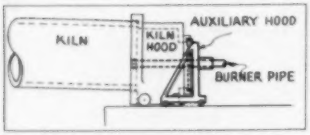



Fig. 4: Auxiliary kiln hood

however, the speed ratio of these double screw dust feeders was purposely made variable. By manipulation of this ratio the operator is able to adjust the withdrawal of the dust from the bins so as to maintain a floating supply in them. From the feeders, which are at ground level, the dust is elevated by belt-type bucket elevators to the top of the kiln feed building where it meets the slurry stream from the ferris wheel feeders in a pug mill. From the pug mill the combined slurry and dust spouts directly into the kilns through conventional kiln feed pipes. The water in the kiln feed is 37 percent.

### Cottrell Precipitator

The precipitator was built by Western Precipitation Corp. and is of the rod curtain and pocket electrode type. It has an automatic rapping and damper closing system. Thus with "closed damper" rapping the stack is clean at all times.

The outside walls and hoppers were insulated with 2 in. of glass wool to prevent condensation of moisture on the inside. The chimney was built by Custodis and is 16 ft. inside diameter at the top and 235 ft. high. It is built of reinforced concrete with corbel shelves every 30 to 45 ft. to carry the weight of the brick lining. Circumferential reinforcing steel was increased 25 percent over normal design to guard against cracks developing at later ages.

### Kilns and Coolers

The kilns and coolers were furnished by Allis-Chalmers and are 11 ft. 3 in. x 450 ft. with 7/16 in. per ft. pitch. Each kiln is driven by two 100-hp. motors with two pinions on each helical master gear. An auxiliary gasoline engine drive with battery self-starters is provided. The complete drive is unusually quiet and smooth in operation.

The kiln building at the burner floor end was extended to cover the first 90 ft. of the kiln and thus protect the burning zone. The balance of the kiln is not under roof.

Instrumentation of the kilns is unusually complete, including such items as automatic draft control for either hood draft or back end draft, oxygen and combustible analyzers, and a thermocouple about midway in the kiln shell with slip ring pick-ups. Most of the instruments are recording as well as indicating so that full records of the kiln performance are available. The burning zones of the

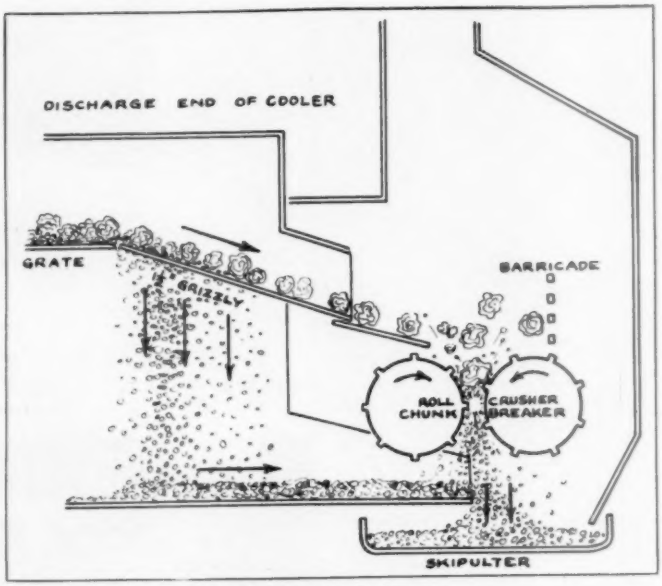



Fig. 5: Roll crusher chunk breaker

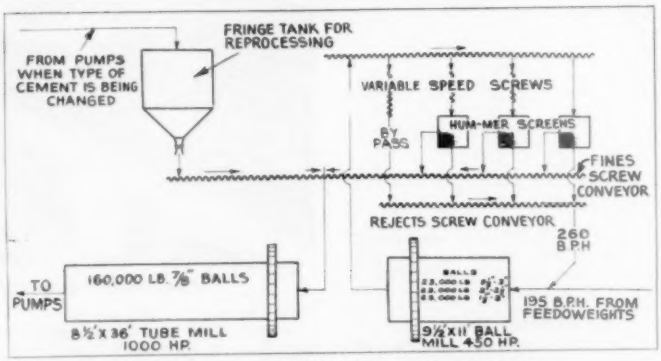
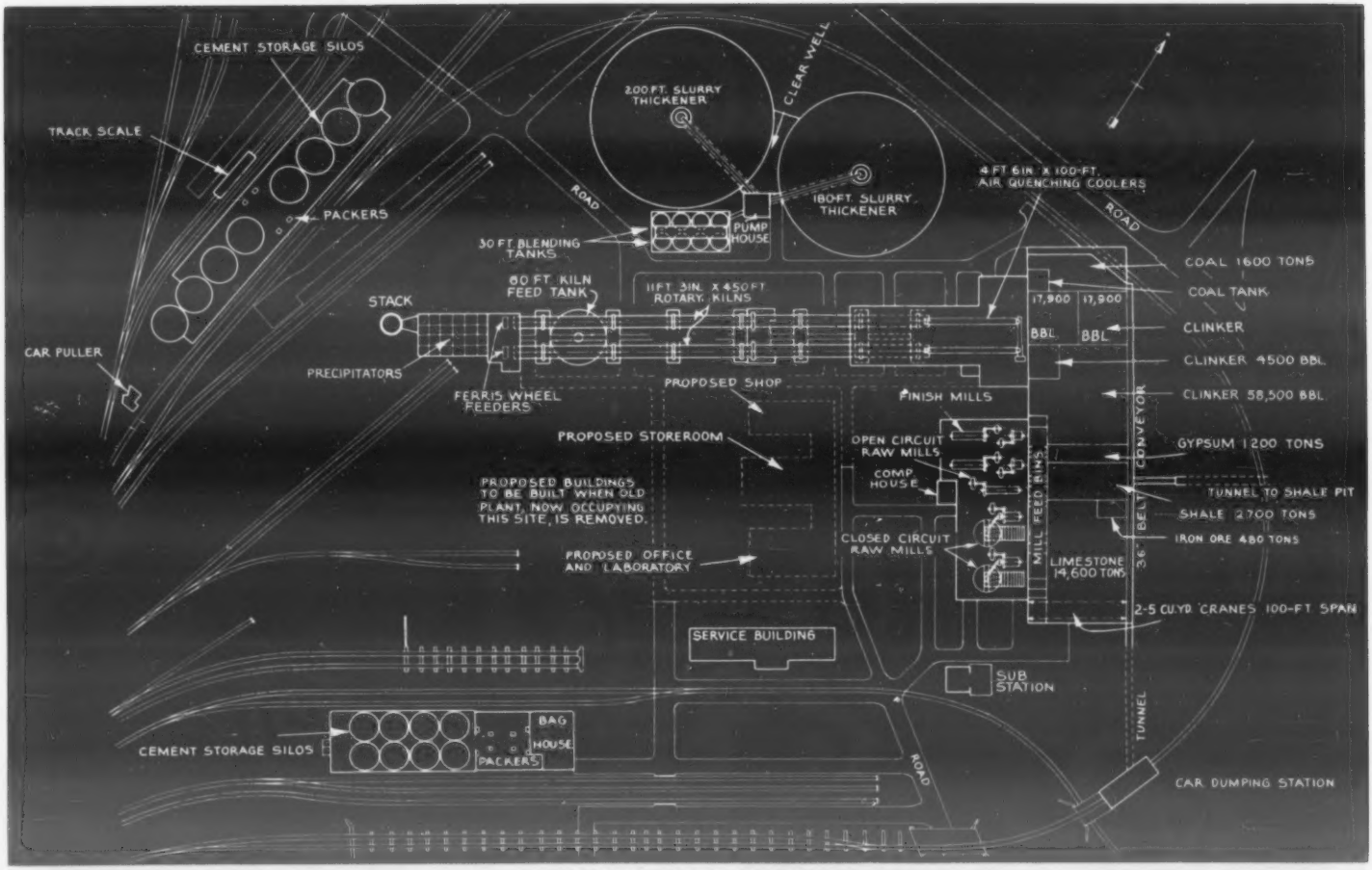



Fig. 6: Finish mill circuit (195 bbl. hr. at 1700 surface area)

Storage and mill buildings were designed with no windows to keep dust inside




Missouri Portland Cement Co.'s St. Louis plant layout

Raw mills are in closed circuit with rake and bowl classifiers; overflow from classifiers is fed into thickeners

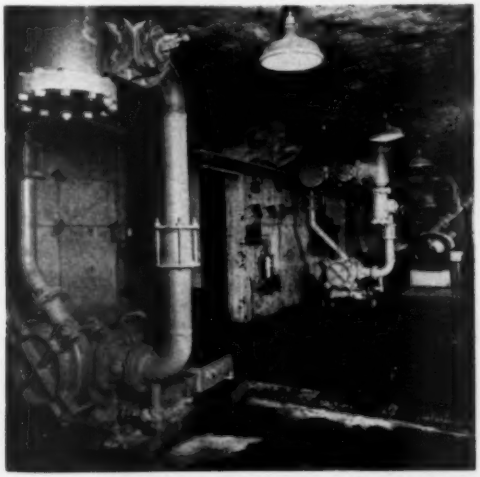
kilns are lined with Magnecon brick and the balance of the lining is 45 percent alumina.

An interesting feature of the kiln is the easily removable hood front shown in Fig. 4. By removing four bolts the whole front of the hood can be removed, allowing a fork truck with pallets of brick to enter the kiln. Each kiln is equipped with 15,100 ft. of chain hung by the loop system.

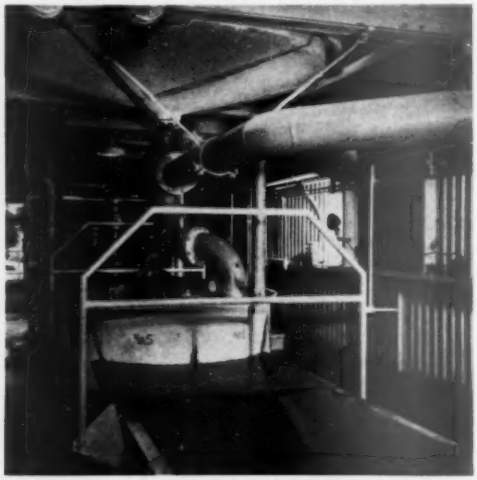
The clinkers from the kilns discharge into 4-ft. 6-in. x 100-ft. Allis-Chalmers air-quenching coolers. Control of the cooler speed is tied automatically to the undergrate pressure so as to maintain a constant clinker bed depth and air flow to the kiln. Firing is by either natural gas or coal. Coal grinding is accomplished with Raymond bowl mills and a special type of burner pipe was designed so that the change from one fuel to another can be made rapidly.

### Chunk Breaker

The coolers discharge through a grizzly to a skipulter and the oversize from the grizzly passes into a roll crusher specially designed for this service. The rolls are set 2 in. apart and travel at 130 r.p.m. The rolls are V-belt driven, have anti-friction bear-

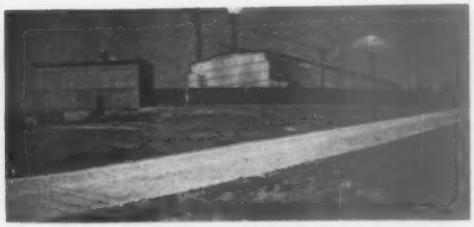


Slurry pumps under basins. Automatic grease supply system for grease seals shown on wall

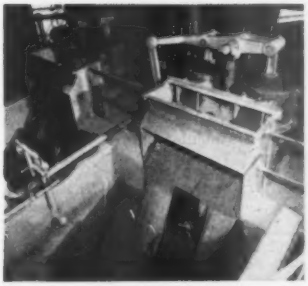


Slurry distributor showing two of the launders which carry slurry to desired tank

Limestone quarry is located nine miles north of plant



Car dumping station is equipped with shakeout and 140-ton track hopper



Diaphragm pumps for handling slurry from the thickeners

Storage and kiln building with thickeners and correcting basins in foreground

Kiln control panel has instruments for all regulation of firing; most instruments are recording

Kiln hood features an arrangement for quick change from coal to gas and an easily removable auxiliary kiln hood

Automatic rappers in electrical precipitator; with "closed damper" rapping, the stack is always clean

Electrical stack dust collector is insulated to prevent condensation inside; dust is reclaimed

| OPERATION | MACHINE | DESCRIPTION | MOTOR | DRIVE |
|---|---|---|---|---|
| CRUSHING AND SCREENING | FEEDER TO CRUSHER | 6'x15' TRAYLOR APRON FEEDER | 30HP-AC WITH DRUM CONTROL | FALK REDUCER |
| | JAW CRUSHER | 56"x72" TRAYLOR ALL STEEL TYPE "HB" | 150 HP-AC WITH MAGNETIC STARTER CONVEYOR, CLEANS @ 100 | V-FLAT BELT |
| | BELT CONVEYOR TO HAMMER MILL | 36"x534'-1½" CHAIN BELT | 100 HP | FALK REDUCER |
| | HAMMER MILL | "CF 15-50 PENNSYLVANIA IMPACTOR | 600 HP REVERSIBLE | DIRECT, WITH RAWSON COUPLING |
| | VIBRATING SCREENS | 5'x12' TY-ROCK TYPE F-600 | 7½ HP | V-BELT |
| CAR DUMPING | CAR SHAKEOUT | ROBBINS | 20 HP | V-BELT |
| | FEEDER TO BELT | 48"x72" SYNTRON "F-3300" | DUAL COIL TYPE VIBRATOR | ——— |
| | CONVEYOR BELT TO STORAGE | 36"x 231'-1½" CHAIN BELT | 75 HP | FALK REDUCER |
| MATERIAL STORAGE HANDLING AND PROPORTIONING | TRIPPER & BELT CONVEYOR | TYPE "P" RE'S TRIPPER & 36"x 350'-0" CONVEYOR, CHAIN BELT | 30 HP | FALK REDUCER |
| | TRAVELING CRANES | TWO PEHLS CU TO., 15 TON 100' SPAN, ON 400' TRACK | 140, 140, 80.60 HP CONTROLLERS | GEAR REDUCER |
| | FEEDOWEIGHTS | ELEVEN 16" BELT & FOUR 24" BELT, MERRICK | 2 HP, D-C | GEAR REDUCER |
| RAW GRINDING AND CLASSIFYING | SINGLE STAGE, CLOSED CIRCUIT, WET MILLS | TWO 10'-8"x 17'-0" NORDBERG BALL MILLS | 1 000 HP | SPUR & PINION |
| | RAKE AND BOWL CLASSIFIERS | TWO 14'-0"x 43'-6", 27'-0" DIA., DORR | 20 HP 7½ HP | V-BELT |
| | SLURRY PUMPS | THREE 8 M A 24 PETTIBONE MULLINEX | 40 HP | V-BELT |
| | SINGLE STAGE, OPEN CIRCUIT, WET MILL | 7'x 30' F.L. SMIDTH BALL MILL | 600 HP | SPUR & PINION |
| | CONCENTRATE PUMP | 4" TYPE "M" MORRIS SLURRY & 4" WILFLEY SAND-TYPE PUMP | 40 HP 30 HP | DIRECT |
| SLURRY THICKENING AND BLENDING | THICKENERS | ONE 200' & ONE 180' DORR | 5 HP | GEAR REDUCER |
| | DIAPHRAGM PUMPS | TWO TYPE "W" #8 DUPLEX DORRCO SUCTION PUMPS | 7½ HP | V-BELT |
| | BLENDING PUMPS | FOUR 8" TYPE "B" MORRIS SLURRY PUMPS | 30 HP | DIRECT |
| | CIRCULATING PUMPS | FOUR 6" TYPE "B" MORRIS SLURRY PUMPS | 75 HP | DIRECT |
| | KILN FEED PUMPS | TWO 6" TYPE "B" MORRIS SLURRY PUMPS | 75 HP | DIRECT |
| BURNING | COAL MILLS | TWO #832 BOWL MILL RAYMOND PULVERIZERS | 200 HP | DIRECT |
| | UNIFORM SECTION ROTARY KILNS | TWO 11'-3"x 450'-0" ALLIS-CHALMERS | TWO 100 HP D-C EACH | FALK REDUCER |
| | INDUCED DRAFT FANS | TWO #15 TYPE "SCLW" BUFFALO FORGE | 100 HP | VARI-PITCHED V-BELT |
| | GRATE COOLERS | TWO 9'-6"x 100'-0" AIR QUENCHING, ALLIS-CHALMERS | 15 HP D-C | V-BELT |
| | FORCED DRAFT FANS | TWO #145 SILENTVANE, WESTINGHOUSE-STURTEVANT | 100 HP | V-BELT |
| CLINKER HANDLING | ROLL CRUSHER CHUNK BREAKERS | TWO UNITS OF TWO 16"x 5'-0" ROLLERS | 5 HP | V-BELT |
| | SKIPULTER CONVEYOR | 28" TO 36"x 46'-6" F.L. SMIDTH | 5 HP | V-BELT |
| | CLINKER SCREENS | TWO 6'-8" TYPE "K" SYMONS, ROD DECK, NORDBERG | 7½ HP | V-BELT |
| | REDUCTION CRUSHER | 4' SYMONS, SHORT-HEAD CONE, NORDBERG | 150 HP | V-BELT |
| FINISH GRINDING | PRELIMINARY MILLS | TWO 9'-6"x 11'-0" NORDBERG BALL MILLS | 450 HP | SPUR & PINION |
| | HUM-MER SCREENS | SIX 4'x10' TANDEM 36 TYLER | VIBRATOR | ——— |
| | TUBE MILLS | TWO 8'-6"x 36'-0" NORDBERG TUBE MILLS | 1 000 HP | SPUR & PINION |
| | CEMENT PUMPS | TWO 8" TYPE "L" FULLER | 150 HP | DIRECT |
| | | | | |
| FLUE DUST HANDLING | CHIMNEY | 16'x 235' BRICK LINED, REINFORCED CONCRETE, CUSTOORS | ——— | ——— |
| | PRECIPITATORS | 4 SECTIONS 3 COMPARTMENT TYPE "HL", COTTRELL | ——— | ——— |
| | DUST RETURN FEEDERS | TWO 6" DOUBLE PITCH SCREW CONVEYORS | 2 HP D-C GENERATOR SYNCHRONIZED WITH MAIN | CHAIN |
| | PUG MILLS | TWO 16" SLURRY DUST MIXING SCREW CONVEYORS, LINK-BELT | 3 HP GEAR MOTOR | DIRECT |
| MISCELLANEOUS DUST COLLECTION | CLINKER DUST ARRESTOR | TYPE #360, FILTER #78, 4'-0" CLASSIFIER, WW. SLY | 25 HP | V-BELT |
| | CEMENT DUST ARRESTOR | TWO TYPE #360, FILTER #39 4'-0" CLASSIFIER, WW. SLY | 40 HP | V-BELT |

**Tabulation of main machinery elements at Missouri Portland Cement Co.'s St. Louis plant**

**Photograph of 11-ft. 3-in. x 450-ft. kilns taken from feed end. Burning zones are lined with magnesite refractories**

ings, and have proved very effective and trouble-free.

Following the roll crusher and skipulter, the clinkers are closed circuited with rod deck screens and a Symons cone crusher. Thus all clinkers are reduced to minus ½ in. before they pass into the clinker storage building. The kiln output has been found to be about 3250 bbl. per day each.

## Finish Mills

The finish mill circuit is shown in Fig. 6. The mills were built by Nordberg and are extra heavily constructed. Particular attention was given to the mill heads and trunnions with all sections thickened at points where failures have been known to occur in the past. Likewise the ratio of shell length to diameter was kept below the point where failures have occurred. Finally, the shells were rolled from sheets which were the full length of the mill so that there were no circumferential wells in the shell. In short, every effort was made to build structural failures out of these mills for their entire lifetime.

## Controlled Size Feed

In the design of this new plant a decision was made to control the size of feed to all ball mills whether raw or finish, primary or secondary. In the past it has not been possible to properly charge ball mills with the proper size of media for most efficient grinding because of the wide range of size of feed to such mills. From this observation the obvious conclusion was reached that the way to obtain efficient grinding from a mill was first to control the size feed to as small a size range as possible and this would then allow more selective sizing of the grinding media inside the mill.

In order to carry out this principle the clinker stream was closed circuited with a Symons cone crusher and screens which hold the maximum size clinker to ½ in. With such a feed the preliminary ball mill could then be efficiently charged as shown in the diagram. The control of feed size to the secondary mill or tube mill is accomplished by Hum-mer screens which carry 26-mesh cloth. Referring back to the quarry crushing operation it will be remembered that the Pennsylvania impactor which supplies the rock to the raw mills is also closed circuited with screens. Thus every ball mill in this new plant has a controlled sized feed.

## Open Circuit Tube Mill

The clinker at this plant was known to have only a mild tendency to coat steel balls and has been successfully ground open circuit in the past. Having a natural aversion to air separators because of the way they clutter up a finish mill, and because of the high power requirements of the air separators and necessary auxiliaries

and finally because of the high maintenance of all this equipment which produces no surface area, it was decided to leave out the air separators but, of course, to leave space for them. Stated differently, it was felt that if the power used to operate an air separator and its attendant elevators and screw conveyors were just added to the tube mill, that probably as much cement would be produced without the bother of having air separators. So far, this has worked out admirably as the kilowatt hours per barrel of cement at 1700 surface area for the overall mill system has been found to be 6.8. This figure includes all auxiliaries in the finish mill building with the exception of the cement pump.

### Fringe Tanks

With the advent of grinding different types of cement through a finish mill, the problem was encountered of what to do with the changeover material that comes out of the mill when one type of cement is being finished up and a new type is being fed to the mill. This problem was nicely taken care of by installing a large steel tank overhead of each tube mill which will hold about 2 hr. grind. This is ample to store the mixture of cements being produced while the new type is coming through. The fringe tank has a very slow feeder through which the cement in the tank can be slowly fed out and reprocessed with the other cement.

All mills, both preliminary and secondary, are fully water jacketed to hold down grinding temperatures. Recording thermocouples are installed in the discharge stream of every mill so that a complete record of cement temperatures is available. With a cool clinker feed to the mills the cement temperature does not exceed 225 deg. F. which is considered quite satisfactory from a grab set standpoint. An overhead trolley crane sufficient to handle one ton of balls in a hopper bottom bucket serves all the mills. Recesses allow this bucket to drop below the floor, making it easy to fill with steel balls either from a dump truck or by just pushing them in from the floor. The recesses are covered with ordinary manhole covers when not in use.

### Vinsol Resin Auxiliaries

With the advent of air-entraining cement numerous makeshift ways have been provided for getting the air-entraining agents into the cement. In this new finish mill complete facilities were designed and installed, first for receiving and dissolving the flake vinsol, next for pumping it to storage tanks above the mills and finally the provision of Rotameter feeding devices for introducing the solution into the mill stream. By these means the muss and inconvenience of handling an air-entraining agent was largely removed.

Partly filled Dorr thickener. Thickeners receive as feed overflow from rake and bowl classifiers in closed circuit with grinding mills

Large motor controls for mill department; arrow points to "inch-er" for spotting manholes to charge grinding balls and for maintenance purposes

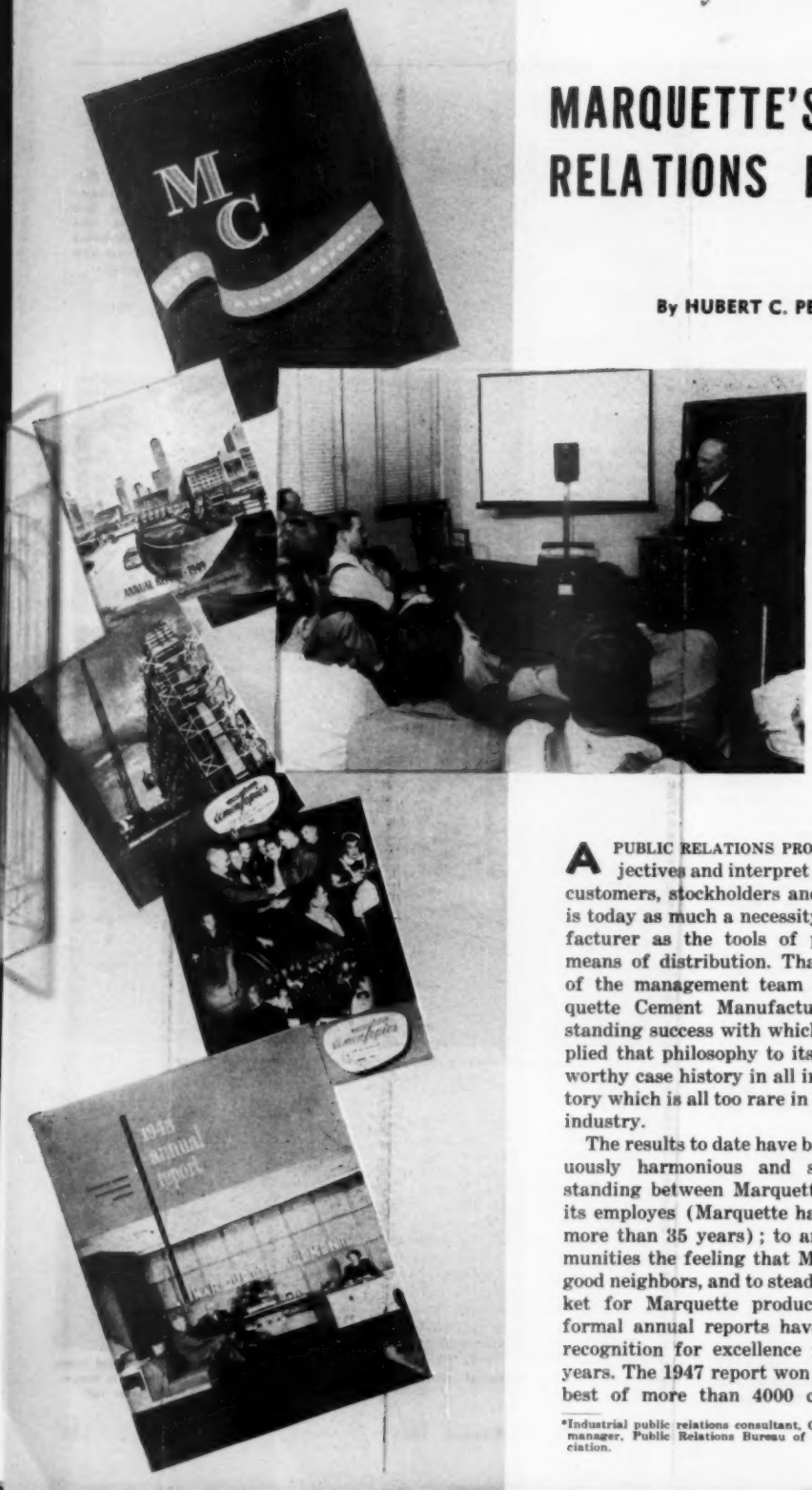
Second floor of finish mill showing electrically-operated screens (right) which are means of feed into mills

The conception of this new plant and its general layout were done by Missouri Portland's Engineering Department of which J. B. Woodward was chief engineer and Walter C. Mueller and Norman G. Metzler the supervisory engineers. The basic engineering studies of each department which resulted in the final selection and arrangement of equipment was handled by W. R. Bendy, consulting engineer. Design of buildings, foundations, and other structures was done by the MacDonald Engineering Co. of Chicago. The plant was built by Fruin-Colnon Co., general contractor, St. Louis, Mo.

All mills are fed at a closely controlled rate by feeders of this type. Each feeder is driven by an individual motor-generator set

# MARQUETTE'S PUBLIC RELATIONS PROGRAM

By HUBERT C. PERSONS*




President W. A. Wecker explains the details of Marquette's financial statements to a group of foremen at the Cape Girardeau plant

A PUBLIC RELATIONS PROGRAM to explain objectives and interpret policies to employes, customers, stockholders and the general public is today as much a necessity to a cement manufacturer as the tools of production and the means of distribution. That is the philosophy of the management team that operates Marquette Cement Manufacturing Co. The outstanding success with which Marquette has applied that philosophy to its business is a noteworthy case history in all industry—a case history which is all too rare in the portland cement industry.

The results to date have been to create continuously harmonious and sympathetic understanding between Marquette management and its employes (Marquette has had no strike for more than 35 years); to arouse in plant communities the feeling that Marquette plants are good neighbors, and to steadily enlarge the market for Marquette products. The company's formal annual reports have received national recognition for excellence for six consecutive years. The 1947 report won a gold Oscar as the best of more than 4000 corporation reports

*Industrial public relations consultant, Chicago, Ill., for many years manager, Public Relations Bureau of the Portland Cement Association.

studied by *Financial World* magazine.

The active management team of Marquette consists of seven men, a chairman of the board, a president, three vice-presidents, an assistant to the president and a secretary-treasurer. These are board chairman Stuart Duncan, president W. A. Wecker, executive vice-president D. S. Colburn, vice-presidents W. W. Dickinson and S. L. Cribari, assistant to the president L. W. Saxby and secretary-treasurer V. J. Hanley. Twelve department heads direct the execution of plans formulated by the management team.

### Marquette History

Marquette Cement Manufacturing Co. is 53 years old. Starting at Oglesby, Ill., in 1898 with one plant producing 91,000 bbl. of cement annually, it has grown to a $35,000,000 corporation with six producing plants and a yearly capacity of more than 10,000,000 bbl.

Plants are located at Oglesby, Ill., Des Moines, Iowa, Cape Girardeau, Mo., Nashville, Tenn., Cowan, Tenn. and Brandon, Miss. The new million barrel wet process plant at Brandon is expected to be in operation by September, 1951.

Capacity at the Des Moines plant was increased by half a million barrels in 1951 with the addition of a second 475-ft. kiln with clinker cooler and coal grinding mill. Two 475-ft. kilns now at Des Moines are among the largest cement kilns in the world.


**Marquette plant billboards carry messages on economics and Americanism. This board, at the Oglesby, Ill. plant, also has a plug for the town**

Marquette also owns three marketing subsidiaries, Cumberland Portland Cement Co., Chattanooga, Tenn., Hawkeye-Marquette Cement Co., Des Moines, Iowa and Hermitage Portland Cement Co., at Nashville, Tenn. Shipping plants are located at Memphis, Tenn. and St. Louis, Mo. Additional shipping plants are projected for Chicago, Ill., Green Bay and Milwaukee, Wis.

Marquette's approach to an intensive public relations program, begun in 1945, was as carefully planned as its procedure over the years in adopting the most modern manufacturing methods, throwing out obsolete equipment, eliminating wasteful practices and keeping its manufacturing and distributing facilities constantly geared to current demands for its product.

The Marquette management team realized that successful public relations involved some deep soul-searching on the part of management; that the whole basis of intelligent public relations work is *to be*, rather than *to seem;* that public relations is not a whitewashing job but must be based on complete honesty of purpose and frankness with each segment of the public including workers, community neighbors, customers, stockholders, the general public and the press. Conduct of such a program requires careful study to search out and eliminate points of irritation in relations with labor, customers and the public. And above all it demands a firm determination to keep everlastingly at it.

Marquette's public relations department, directed by Jack K. White, and its industrial relations department headed by W. E. Erwin, work in close harmony. It is regarded as important that all industrial relations activities should foster good public relations and that all public relations work should similarly further harmonious industrial relations.

### Company Attitude

The attitude of Marquette management toward public relations was clearly expressed by president Wecker in the company's 1950 annual report released in 1951, in which he said:

"In the complex world of today with its conflicting ideas and opinion, it is no longer possible to rely upon the old injunction 'They shall be known by their works,' for the good opinion of the public. Today it is necessary to inform and interpret, to analyze and dissect, all for the purpose of getting the public to understand one's objectives and to present reasonable proof that they are in the public interest.

"This is the philosophy that continues to actuate us in our public relations work. Relatively we are not a large company and our voice does not reach a national audience. But we do talk to those closest to us, to Marquette people, to the people in our local communities, and to our customers. We also try to reach the principal seats of learning and state and Federal officials, particularly those of the area we serve.

"It is difficult to evaluate the effectiveness of work of this sort. However, the opinions of others on what we are doing have been favorable. Our annual reports have been awarded recognition for excellence in the past six consecutive years and both stockholders and employe reports are now used as study pieces in colleges all over the country. Our annual report advertisement in 1950 was rated second best among thousands. Nationally syndicated newspaper columnists and editors have commented favorably on our efforts and we have received recognition in the field of business writing.

"In view of this we continue to believe that our voice is a help in the overall effort to forestall the destruction of the only way of life that exalts the freedom and dignity of the individual."

In the light of Marquette's nearly seven years of public relations work, director of public relations Jack White rates employe relations as the most important. Next in the order of importance he places customer relations, community relations, stockholder relations and press relations.

### Employe Relations

Marquette executives do not claim to have devised the perfect formula for employe relations. They are convinced that good employe relations is an essential foundation for sound public relations procedure in other fields, especially that of community relations. They feel that the more completely informed an employe is about all phases of company operation the less likely he is to believe idle gossip and subversive propaganda aimed to undermine the American free enterprise system. They know that much misinformation, some of it deliberately malicious, is being circulated about the cement industry, especially about allegedly huge profits being made by cement companies.

Acting on these beliefs, Marquette in 1948 began a series of monthly meetings with foremen at each of the plants as a part of what the company called its "management development" program, designed to make supervisory employes realize that in the eyes of the plant men they are a part of management. Plant arrangements were worked out by industrial relations manager Erwin. Director of


**Marquette has developed a number of publications to present its financial report to its employes simply and effectively. At left is a simplification of the 1949 annual report, with the opening two pages below it. The report at top center was laid out in comic book style**

public relations White had charge of the preparation of slide films and special literature to simplify the company's elaborate formal 1947 annual report.

At this time president Wecker took the field to conduct meetings personally with foremen in every plant, deliver man-to-man talks and invite questions about all phases of company operations including profits and annual balance sheets.

"It is well to remember," Mr. Wecker told the supervisory employes, "that up here in the front line it is you who are the company as far as the workmen are concerned. Here you have the employer-employe relationship reduced to its simple, essential terms. If you give the workman a square deal then the company is swell. If he gets the idea, rightly or wrongly, that you threw him a curve then the entire company is a lousy outfit. To the workman his immediate boss is management."

### First Report to Employes

Mr. Wecker showed the foremen the exact "where from, why, and how much" of all business dollar income and outgo. For this purpose the company used a unique booklet titled "Report to the Investor in Mr. Marquette's One-Man Cement Company," which broke down each item in the company's 1947 annual report to a per employe basis. Expressed in the language of the personal budget, as though each employe were in the cement business for himself, the simplified report showed clearly the exact sources of all company capital, income and the costs involved in producing that income in 1947. The report illustrated the underlying simplicity and logic of all items making up a formal financial statement.

For example, in the matter of capital outlay, the booklet demonstrated that "Mr. Marquette's One-Man Cement Company" alone represented an investment in plant or tools amounting to $19,826, of which $16,690 was provided by investors. "Mr. Marquette" was then shown to have produced, on that capital investment, a net return in the amount of 6¾ percent in 1947, the investors' share in dividend payments being 2½ percent.

"It is clear from the facts presented," Mr. Wecker said, "that the figures for a business are only big in proportion to the sum total of people involved. It must be clear too, that so-called Big Business does not get overly large net income returns. On the contrary, when reduced to one-man terms, it is apparent that big business does not fare any better than little business, if as well, at least no better than the corner grocer or druggist."

### Frank Talk Before Union

About the time Mr. Wecker was scheduling his plant visits, he accepted an invitation to be a guest speaker at an annual convention of the Cement, Lime and Gypsum Workers' International Union, meeting in Salt Lake City. Marquette plant workmen are members of that union. Mr. Wecker addressed the union delegates with entire frankness regarding Marquette's policy, emphasizing his belief that both management and labor have an obligation to each other and to the public.

"We cannot deny," he said, "that management still has more to learn about the reasons for the viewpoint of workmen and the ways in which they

give expression to them. On the other hand we also cannot deny that labor (and here let me remind you that I speak of labor as a whole) appears to have an unsolved problem in bringing to its members better understanding of their end of the obligations undertaken by all in a union contract. * * *

"Management has come a long way," Mr. Wecker said, "in recognizing that cheap paternalism is not a satisfactory solution to the problems of workmen; that it does not mesh with our American concept of the dignity and freedom of the individual. Labor, on the other hand, understands pretty well that industry is not a bottomless horn of plenty from which can be poured forth an endless golden stream quite regardless of the factors that produce that golden stream. * * *

"But of greatest importance," Mr. Wecker declared, "is the fact that most of us are beginning to understand that the paths of labor and management lie parallel with each other. Today, for the most part, we still go forward along opposite sides of the ridge. As time goes on we shall more and more come to see the need for and the advantages of traveling the broad road together. Then there will be little striving on the part of each to take something away from the other. Rather there will be mutual effort to see how much each can be of help to the other."

### Marquette's Pioneer Work

Marquette is one of the pioneers in frank reporting to employes. It is a consistent policy of the company to give *all information* on its activities to the employes *before* it is released to the public. Copies of news stories, advertisements, booklets and folders are posted on plant bulletin boards before being given to anyone outside the Marquette organization. Copies are also sent to William Schoenberg, general president of United Cement, Lime and Gypsum Workers Union.

All Marquette plants have bulletin boards at five or six points where employes congregate. Large painted and illuminated billboards occupy a prominent position at the plants. These carry a public relations message which is changed three or four times a year. These messages are on economic subjects or Americanism. Typical billboard copy was that used for a time last year: "The United States is the only country in the world with a long list of people wanting to live within its borders."

Three years ago Marquette launched a monthly employe magazine *CementTopics*, "published by and for the members of the Marquette Cement Manufacturing Co. family . . . to talk about the things you would like to know about your associates and your company." This magazine and all other literature directed to employes is mailed directly to the home of each worker. An editorial advisory board consisting of Messrs. Wecker, Colburn, White and Erwin passes on all copy, but the editorial staff is recruited from cement workers and the bulk of the articles used are written by plant people. The magazine is printed in two colors on glossy stock and is generously illustrated with halftones and cartoons. Occasionally an appropriate story by some notable person is reprinted as was an article by Irving S. Olds, board chairman of U. S. Steel, entitled "America, Land of Privileged Millions—and No Privileged Few." This appeared in the June, 1951, issue.

### Interpreting Annual Reports

Marquette's careful attention to the presentation of its formal annual reports to stockholders, the general public and the press has been mentioned previously. But how to simplify the same facts for the information of mill employes, some of whom have had little formal schooling, posed a different problem. After the enthusiastic interest shown by plant employes in the "One-Man" cement company version of the 1947 full-time employes. This booklet was mailed to the homes of all employes on June 1, 1949.

Although Marquette officials felt sure that the "Tom, Dick and Harry" booklet was welcomed and read by the plant employes, they engaged the Business Research Corp. to make a cross section survey among hourly-rated workers at two plants. The survey report made it apparent that Marquette employes generally liked the "Tom, Dick and Harry" booklet and wanted to receive a similar report each year. The purpose of the survey was to determine how the booklet was received, how it was used by employes and what it accomplished.

On the question of whether employes read and remember what the company publishes, the survey data showed that they do, and that the comic book technique was well suited for the purpose. "Not only did a good percentage of employes read the booklet and remember it," the survey report said, "but also a well defined interest in it was shown by wives, children and friends."

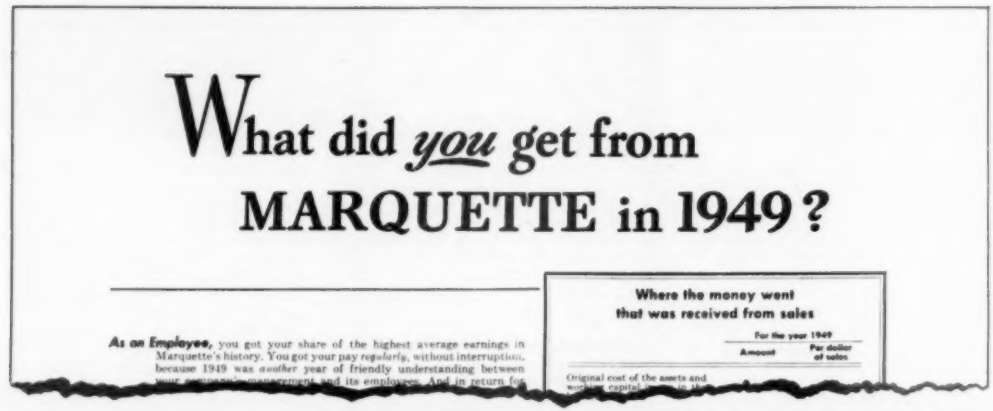
The question as to whether employes learned anything from the booklet was also covered. The survey

Executive vice-president Colburn gives details of company affairs to Marquette supervisory employes at the Des Moines plant

report, it was decided to apply the popular comic book technique to a simplified edition of the 1948 report. This was a 16-page, three-color booklet entitled, "Tom, Dick and Harry, the Marquette Team." Likable characters representing a stockholder, an old-time employe, and a new employe were pictured in a discussion of company profits. As was done the year before, the company's balance and income statement were analyzed on a one-man basis, the dollar figures being divided by the average number of

report indicated that they did. Interviewers tested the ability of employes to recall the booklet and identify new ideas they had obtained from it. Business Research reported that the employes gave the booklet "credit for having brought them new ideas, and were able to name in detail the ideas in fairly large numbers and kinds."

The survey report also showed that a large majority of plant employes want to receive company information but that most of them are unable to specify the kind and extent of the



What did *you* get from MARQUETTE in 1949?

**Where the money went that was received from sales**

For the year 1949

| Amount | Per dollar of sales |
|---|---|

Original cost of the assets and

***As an Employee,*** you got your share of the highest average earnings in Marquette's history. You got your pay *regularly*, without interruption, because 1949 was *another* year of friendly understanding between

**Part of a full page advertisement run in papers in all the plant cities to show how everyone benefits from business operations; this received best award for all manufacturers' advertising for 1949**


**Jack K. White, director of public relations, right, accepts Oscar from Weston Smith, vice-president of Financial World Magazine, for Marquette's outstanding 1949 annual report**

information they want. "The survey results demonstrate," said Business Research, "that the employes in general are more concerned with whether or not the company will 'tell the story' than with what the story may tell."

### Workers Want to Know Facts

On the overall attitude of employes toward the "Tom, Dick and Harry" booklet, the reporters concluded: "It was evident during the course of the interviews that the 'Tom, Dick and Harry' report has aroused much employe curiosity and interest, and has stimulated considerable desire for more company information. A great majority of employes was able easily to express its genuine approval of the method of presentation, as well as the message itself. It was interesting to note the reactions of quite a number of employes who expressed both surprise and pleasure because of having received such information. It is notable that there was no evidence indicating even the slightest degree of displeasure among employes toward the material covered in the report or toward the company for having published it."

This survey plus their own observations convinced Marquette management that plant employes want the company to keep them informed, and that annual reports especially designed for them should have a permanent place in employe relations work. The survey also had a bearing on Marquette's decision to establish the employe magazine which has been previously described.

To interpret the company's 1949 income statement and balance sheet, Marquette chose a modification of the comic book style and put out a beautifully simplified eight-page folder entitled, "One of Us Looks At Marquette's 1949 Record." This was printed on heavy 8½ x 11 in. stock in two colors, interestingly illustrated with many wash drawings and colored graphs. The front cover carried an attractive drawing symbolizing a cement worker on the job. The back cover was a pictorial chart captioned, "Where Each Dollar Went That Came from Marquette Sales." Text matter was presented in primer-style, easy-to-read, hand lettering.

The folder told the Marquette story from the viewpoint of an avowedly skeptical character who says at the beginning: "I suppose the company and the stockholders got most of the money." He then gets all the facts from the company books and is satisfied that the business is being run on a sound and equitable basis.

It was found that this folder was not only perfectly suited for reading by plant workers but that it created a demand from other people in plant communities and from many Marquette customers. Mailing was also made to teachers, clergymen and other civic leaders in plant areas.

### "Teaser" Copy Used

A new technique was also applied to develop the interest of plant workers in the folder in advance of its mailing. This consisted of two-color "teaser" posters on plant bulletin boards, posted for a week or so before the mailing date.

"WHO Got the 20 Million"? shouted the first poster.

"WHO Got the 20 Million? Do you know the full story"? teased the second poster.

"WHO Got the 20 Million? Watch your mail box," advised the third poster.

Then the day after the folders were received by the plant employes, a final bulletin board poster asked: "NOW do you know who got the 20 million? The answer is in 'One of Us Looks at Marquette's 1949 Record' the booklet sent to your home the other day. If you didn't get yours, ask for a copy at the office."

The 20 million, of course, referred to the approximate total of what the company took in during 1949 without considering operating expenses, taxes, payment to labor or for materials or any other item of expense. A few days after the mailing of the folder large advertisements were published in daily and weekly newspapers in all plant towns headed, "Who Got the 20 Million"? and including a coupon on which anyone interested could write for a copy of the folder. Hundreds of requests were received at Marquette's Public Relations Department in Chicago. A similar advertisement was published in the following issue of the employe magazine, offering the folder to anyone who had not received it or who wanted an extra copy.

### Picture Book is Popular

The hand-lettered picture book style was again adopted for the 1950 report to employes. This was a 12-page, two-color folder entitled "Report to Our People for the Year 1950." Total receipts for the year, again simplified to a per-employe basis, were illustrated at 126 stacks of dollar bills with $100 in each stack. The drawings and text showed what was done with this money. On the outside back cover the facts were further simplified in an illustrated chart headed, "Here's how the 100 cents of each dollar we took in last year was divided."

In addition to the customary mailing to employes at their homes and to influential citizens in each plant community, the 1950 report was also published in the employe magazine, *CemenTopics*. At the same time a large advertisement headed, "How Much is a Dollar"?, was published in newspapers in plant towns and in several magazines. This carried a coupon on which the reader was invited to request a copy of the formal, 32-page annual report.

### Marquette Safety Work

One activity for which Marquette plant employes are directly responsible is the outstanding safety and accident prevention work done by the company. All Marquette plants have been awarded the Portland Cement Association Safety Trophy for accident-free operation during a full calendar year. The five producing plants have won the trophy 30 times. But the Cape Girardeau plant achieved a record of more than 3,600,000 manhours of work without a lost-time accident, a record which the National Safety Council said had never before then been attained in the cement industry. This represents more than 5½ years of accident-free operation.

The Cape Girardeau record was celebrated with a buffet dinner, dancing and a show by professional entertainers. The party was held in the Arena at the Cape Girardeau Fair Grounds with an attendance of more than 1500 including all plant employes, their families, Marquette executives and many notable guests.

Another vital part of Marquette employe relations work is the participation by plant people in observance of holidays and special events. During the summer of 1948, when Marquette passed its 50th year, a series of gala golden anniversary parties was held in all communities in which company plants and offices are located. These were attended by all Marquette employes, their families and invited guests.

Christmas parties with gifts for each employe, their wives and children are an annual event at each plant.

Every Marquette plant and the general office has a company sponsored bowling team. An inter-plant tournament is held annually.

Constant and frank interpretation of all phases of company operations, especially regarding cement prices, is the established policy of the Marquette management in its relations with customers. Marquette's aggressive insistence on absorbing freight costs on its product to give cement users the lowest possible price at point of use, in spite of attempted restraint by the Federal Trade Commission, pleases customers but gives many competitors the shivers.

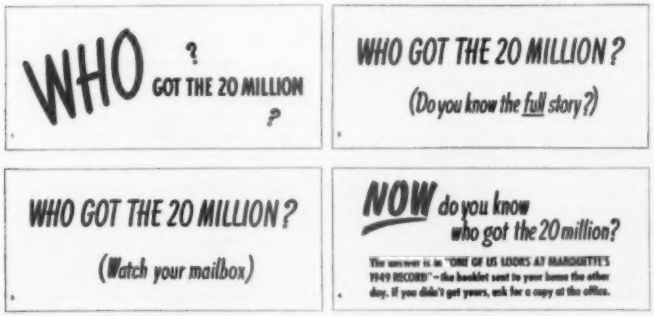
Decades of harassment of the cement industry by the Federal Trade Commission in the matter of absorbing freight rates on cement to meet competition has made many cement manufacturers touchy, if not timid, especially as concerns discussion of selling practices.

Marquette contends in printed matter and advertisements, and produces statistics to back up its contention, that f.o.b. plant pricing of cement is costing consumers many millions of dollars. Many cement manufacturers follow to the letter F.T.C.'s interpretation of a Supreme Court ruling, in May, 1948, supposedly forbidding cement makers to absorb freight rates from plant to point of use in order to meet competition. But immediately after that Supreme Court action, Marquette in letters to customers and in paid advertisements declared, "Nothing in the recent Supreme Court decision in the 'Cement Case' requires Marquette to change its sales policy. This company intends to sell cement delivered to the buyers' destination at wholesale in carload lots. If we find that our price at any destination where we seek to do business is higher than the price of a competitor, it will continue to be this company's policy to meet that lower price whenever it seems good business to do so.

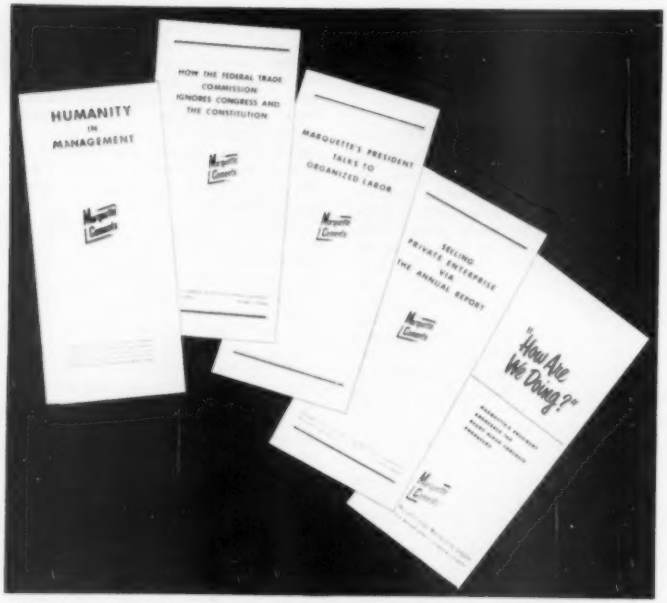
"We find nothing in the decision of the Supreme Court which forbids this policy. That decision merely requires the enforcement of a cease and desist order of the Federal Trade Commission. That order, as the Supreme Court makes clear, is directed solely against certain business practices when done pursuant to combination or agreement. * * * Marquette Cement Manufacturing Co. never has and does not intend ever to use, or have any part in, any method of pricing which involves combination or agreement. * * * Independence, not combination or agreement, has always marked Marquette's pricing and marketing policy. This policy will be maintained."

### Charges Usurpation of Power

On October 18, 1949, president Wecker delivered a forthright talk on cement pricing economics before the Illinois Manufacturers' Club at La Salle, Ill. His address entitled, "How the Federal Trade Commission Ignores Congress and the Constitution," charged F.T.C. with usurping Con-




Bulletin board posters used to develop employe interest in annual report




**Many of the speeches by Marquette officers have been reprinted and distributed to employes and other interested persons**

gressional powers in a way which threatens the whole American economy.

"In this state of affairs," Mr. Wecker said, "the only real legislative problem is how industry may be freed from the restrictions imposed upon competition by the Trade Commission and how a repetition of bureaucratic confusion and chaos may be avoided by preventing this Commission from substituting the whims of its economic theorists for the laws made by Congress. * * * Remember this," he told his audience, "no compromise is possible between the philosophy of a planned economy and the freedom of a constitutional government. Bureaucracy is a step in the regimentation of all people for some form of Statism and, in the end, serfdom under some ruthless tyrant." The address was printed in a 24-page, pocket-size folder and given wide circulation.

On June 30, 1950, after President Truman vetoed a bill intended to redeclare the lawfulness of independent, competitive delivered pricing, Marquette issued to its customers and the press a four-page folder entitled, "Where Do We Go From Here in Our Pricing Practices"? In this Marquette repeated its intention to continue to quote delivered prices and also said:

"Statistics on file with a Senate Committee show that f.o.b. plant pricing, induced by the previous pronouncements of the Federal Trade Commission * * * has cost the public many millions of dollars in the last few years. This need not go on."

Again on September 7, 1950, in a four-page customer folder headed, "Why This Pricing Confusion"? Marquette pledged itself to continue its long-time pricing policy and gave specific instances in which f.o.b. pricing works hardships on cement users.

## Discusses "Pricing Dilemma"

President Wecker is in demand as a speaker before various organizations of cement users. He was a guest speaker at the 21st annual convention of the National Ready Mixed Concrete Association in New Orleans on February 15 of this year. After discussing production and shipping problems common to cement manufacturers and ready-mixed concrete producers, Mr. Wecker took up the subject of what he called "the cement pricing dilemma."

"Most of you are well informed and keenly aware of what happens when you are compelled to purchase on a strictly f.o.b. plant basis," he said. "You know now that it costs you more money for that portion of your requirements of cement which you cannot purchase from the closest sources. You know that generally your sources of supply are restricted and that you don't any longer have the freedom of choice you once enjoyed."

## Charges Double Talk

Accusing the Federal Trade Commission of "double talk," Mr. Wecker told the ready mix operators that there is no consistency in the rulings of the F.T.C. "In one breath," he said, "it [the F.T.C.] condemns the lowering of a price to secure business as unfair competition. In another breath it charges that any meeting of competitive prices establishes a conspiracy in restraint of trade. Then it indulges in meaningless press releases to the effect that not every meeting of a competitive price is unlawful, but never specifying when that condition exists.

"In view of such double talk it is no wonder that the average business man has completely lost track of the basic laws and his rights thereunder. It is no wonder that he has become weary of arguing logically where logic falls on deaf ears. It is no wonder that he has taken to following, sheeplike, whatever seems to be the least frowned on at the moment by the Federal Trade Commission."

It is obvious that the cement manufacturers who follow the policy of letting well enough alone in regard to F.T.C. mandates lose no profit and court no trouble. Presumably a considerable number of the more progressive cement manufacturers secretly applaud Marquette's fight against F.T.C. domination but hesitate to join the conflict lest they be charged with unlawful conspiracy. Recently a few have spoken up but many still follow the "laissez faire" doctrine.

## Community Relations

Marquette has demonstrated that it believes that the basis of good community relations is good employe relations. The employe relations work which has been described in detail shows how it is all closely tied in with each local community.

Marquette does a careful job of compiling mailing lists of community leaders and molders of public opinion and of keeping such lists up to date. The company's current list includes about 9000 names, classified by occupations. These mailing lists are secured and kept fresh by the use of what Marquette calls "Town Reports" by cement salesmen. The salesmen furnish the public relations department with not only the names of owners and buyers in ready-mixed and concrete products plants, contracting, engineering and architectural firms, but also the names of secretaries of the various influential organizations. These include local Chambers of Commerce, business associations and all luncheon clubs and service clubs such as Lions, Rotary, Kiwanis and Optimists. Professors in colleges and high schools who teach civics and financial subjects rank high in the mailing lists.

How Marquette uses newspaper space to publicize in each community its special reports to plant employes has already been discussed. The more formal reports of the company are

also mailed to a large list of influential people in plant communities, usually to a list of approximately 7500.

Much of the material described under customer relations also goes to leaders in plant communities including clergymen and educators. Marquette believes that an important part of its public relations job is to combat misinformation as well as to provide accurate information.

At a New York banquet attended by 1000 leading industrialists, when Marquette received a gold Oscar for the excellence of its 1947 annual report, president Wecker referred to the fact that these reports were not alone for stockholders but were intended to serve as a medium of educating the public on the truth about the cement industry. He pointed out that this involves an entirely different problem and approach than when dealing with stockholders or customers alone.

### Attacks on the Industry

"In the remainder of our public," Mr. Wecker said, "we encounter the whole gamut of hostility, running from fixed notions of corporate greed —expressed in convictions on subjection and exploitation of workmen, price fixing, and excessive profits—on to adherence to ideologies under which the private enterprise system would cease to function altogether.

"We are continuously appalled at the viciousness of the attacks upon business from various and sundry quarters. And we get very little comfort out of discounting them for their obvious self-serving content. * * * By and large, the general content of these attacks, when shorn of their emotional appeal, cannot be reconciled with the facts. But the facts are not being brought out as they should be brought out. These detractors are not being challenged as they ought to be challenged. The damage being done to all segments of society continues unabated."

Many leaders in the cement industry doubtless agree with Mr. Wecker's viewpoint. For example, it is a matter of pride with cement men that since 1926 the price of portland cement has increased far less than the average price of all other construction materials and has remained well below the price curve of all commodities. But a majority of the cement manufacturers make little effective use of these facts.

### Few Voices in Defense

Strangely enough there are also few in the cement industry who do anything about defending it from unwarranted attacks in the press arising out of ignorance or malice. These attacks seldom originate in newspaper or magazine offices. But bumptious bureaucracy has a thousand voices and hundreds of busy mimeograph machines. Frequently conscientious and skeptical editors question alleged facts in news releases detrimental to the cement industry but too often fail to find a cement company executive who is willing to stick his neck out and give the industry's side of the story.

This situation does not mean that the portland cement industry is unprogressive. As a matter of fact on technical matters it is perhaps the most progressive industry in the world. Nearly all cement companies are members of the Portland Cement Association which does a superb job of research, product development and promotion of the uses of concrete in addition to its splendid work on accident prevention. But the association cannot speak for the industry on matters concerning cement prices, labor relations or community relations. These things are solely the business of each individual cement company. Sometimes what is everybody's business becomes nobody's business.

### Stockholder Relations

Marquette provides its stockholders with full information on all phases of its business as frankly and clearly as possible. "In this phase of our reporting," president Wecker says, "we try for a high degree of objectivity. We attempt to anticipate the stockholders' questions, having in mind our own irritation on finding gaps in some of the annual reports we read."

Marquette stockholders receive the formal annual reports, special quarterly reports and for the past two years have had a neatly printed four-page house organ known as *Marquette Stockholders' News*. This was started in June, 1950, and has been issued every three months, although the masthead says, "To be issued occasionally."

### Press Relations

The success and smooth operation of all phases of Marquette's public relations program is to a large degree dependent on frankness and fair dealing with both the daily and the periodical press. Public relations director Jack White, who has had years of experience as a working newspaper man, practices no evasions and uses no double talk in dealing with the press. He aids the members of the press in getting questions answered. He helps them obtain good pictures. He insists that all Marquette news releases must contain accurate and understandable statements. As a result Marquette has enjoyed "a good press."

Marquette issues about 24 different pieces of literature each year, including annual reports, employe and stockholder magazines, reprints of speeches by executives, reports on price and market situations, plant improvements, personnel changes and similar subjects. In addition Marquette uses substantial advertising space in many newspapers and magazines. Sets of these advertisements for Marquette and its subsidiaries are bound and circulated in the plants and offices.

All the Marquette public relations activities are conducted on an annual budget usually of about $150,000, including the display advertising which is prepared under the direction of the public relations department. However, both budget and programs are kept flexible to meet current conditions.

It may be pointed out that any cement manufacturer with the same courage and honesty of purpose could do as well. Unfortunately few have done so.

**Families of Nashville plant employes, as did all other plant employes, took part in the Marquette anniversary party**

## Lehigh's program at Mason City, Iowa, features storage and blending facilities, air-swept raw and finish grinding; all departments revamped to improve performance and enlarge capacity

ALL OF THE PLANTS of Lehigh Portland Cement Co. have undergone extensive improvement in a comprehensive postwar rehabilitation and expansion program costing many millions of dollars. The programs at the various mills have varied according to the requirements essential to bring them into line cost-wise, and to fit them to conform with the size of markets and demands for the several types of cement.

The largest single project was the rehabilitation program completed in 1950 at the Mason City, Iowa, plant, where much of the major equipment needed replacement to reduce excessive maintenance. With the exception of the kilns and the finished storage for cement, the plant has been virtually rebuilt. Included in the new installations are the raw and finish grinding departments; covered storage for raw materials, clinker and coal; blending and raw material storage bins; packing facilities; kiln drives; improved kiln feed arrangements; stack dust collectors; and increased capacity to generate electrical power from waste heat. Rated annual capacity has been stepped up from 1,200,000 bbl. to 1,800,000 bbl. of cement as the combined result of the rebuilding, and placing two of the six original kilns back into service.

### From Dry to Wet to Dry Process

When built in 1910, the plant was dry process, and the exit gases were exhausted at high temperature. There were six 9-ft. 6-in. x 9-ft. x 140-ft. rotary kilns, which are the kilns still in service. Waste heat boilers were installed in 1924. In 1925, the mill was converted to wet process and the kilns were fed a 32 percent moisture slurry. Then, in 1932, two of the kilns were taken out of service and the other four were equipped with filters. The plant has been operated as a wet process mill with filters until the recent rebuilding program, when it was converted back to a dry process, waste-heat plant.

Since equipment in both the raw and finish mills was obsolete and because low-water content slurry was excessively corrosive on equipment, the choice was to rebuild extensively with thickeners, wet mills and other equipment to handle thin slurries or to convert to dry process. The decision to go dry process was made on the basis of anticipated lower maintenance and because it was believed that an adequate, well-designed system for blending dry raw materials would permit the uniformity of kiln feed material attainable through the wet process. Accordingly, an unusually flexible system for blending and reblending raw materials was built that is an outstanding feature of the plant.

A number of kominuters, tube mills and other types of grinding equipment were replaced, and air-swept tube mills of the type now in operation at the Fordwick, Va., and Metaline Falls, Wash., plants were installed in the finish mill as well as in the raw mill.

By virtue of conversion of the kilns from wet to dry process, without water to evaporate, and uninterrupted feed of the kilns, which was unattainable before, the capacity of clinker from each kiln has been stepped up from 800 bbl. per day to 1000 bbl. This increase plus the output from the two kilns which were inoperative since 1932 have added up to the 50 percent increase in capacity rating. Standard portland cements, Type I, IA, and III and mortar cement are manufactured. Type II cement will also be made.

### Mill Layout

New structures include the single mill building for both raw and finish grinding, the raw storage and blending bins and the covered storage area. The old raw material building, a structure almost 1000 ft. in length, which is filled by belt conveyor from the crushing plant and from which limestone and clay are withdrawn by belt conveyor, has been retained in the new flowsheet. It serves the purposes of additional reserve storage capacity and preblending through a rehandling system that does a good job of intermixing. Finished cement is stored in a similar long warehouse-type structure which comprises three sections, with packing stations between.

The new raw material and clinker storage building is the key to efficient material handling, comprising one leg of an L plant design, with the kilns representing the other leg. Adjoining the storage area, inside the L, is the mill building in which the separate mills receive their feed from individual overhead feed bins along the wall of the storage area. They are filled by an overhead electric traveling crane.

### Operating Features

This storage area is one of the outstanding features of the plant as is the use of air-swept grinding mills, for both raw materials and the primary clinker circuit, in closed circuit with air classifiers and cyclones rather than the more conventional mechanical air separators. Dust control has been emphasized throughout in the new installations, and the use of separate bag-type automatic-discharge collectors in critical locations has contributed to practically dust-free operation.

Since the Fuller-Huron airslide was first used at the Alpena, Mich., plant of Huron Portland Cement Co., this simplified, low-cost method of conveying fine-ground materials has been applied for various functions in many mills but, thus far, not to the extent at Mason City where airslides are used effectively to the fullest possible extent. The typical installation, wherein the enclosed duct-type of airslide is used to convey materials, performs many useful functions throughout the plant, for conveying the raw mill stream to storage, cement into storage, air separator rejects into the finish mills, dust, etc.

In addition, there are applications of this pneumatic conveyor unusual to the cement industry. One use is application of the so-termed "water-level" type of airslide for handling kiln feed material to the kilns from the blended material bins, whereby material is withdrawn from an airslide to the respective kiln feed screws, and in which the stream carried, through a circulatory principle, fills the airslide to guarantee a constant rate of feed being delivered into each kiln. This same kind of airslide is used to fill the new packing machine feed bins.

The open-type airslide, which in effect is part of a bin bottom upon which material rests, is the means of transfer of cement from steel bins into a bucket elevator from which the packing machine bins are filled via

By BROR NORDBERG

the aforementioned overhead airslides. Another unique application is in distributing cement into storage so as to minimize dust. Cement is pumped into small overhead receivers inside the warehouse storage areas and is distributed into storage by open-top airslides. As a storage compartment fills, the airslides become submerged, progressively from their lower ends, with the result that the cement is let down gently into storage. A source of a great amount of dust has thus been eliminated.

Also of interest is the fact that all of the dust, accumulated at the feed ends of the kilns including that collected by the stack electrical precipitators, is put back into the kilns. The practice of re-introducing this dust into the system, by F-K pumps into the raw mills, is unique.

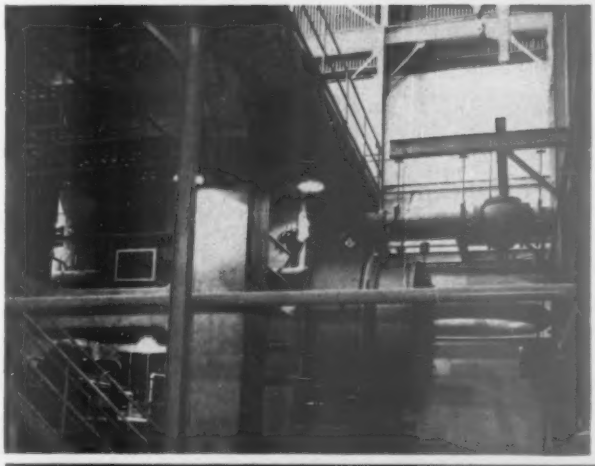
## Quarrying-Crushing

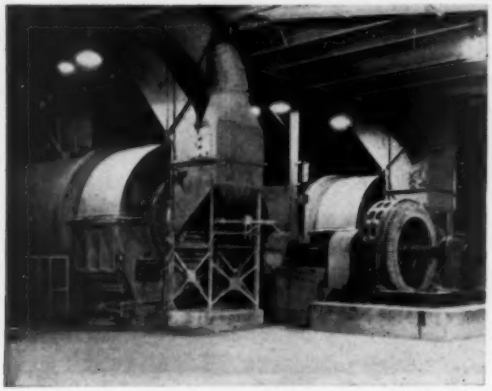
All the raw materials for cement manufacture with the exception of pyrites and gypsum retarder are available within a mile of the plant. Limestone occurs in a comparatively thin bed and the quarry has a 25-ft. face. Operations extend out rapidly, as a result, and recently a new quarry has been opened. The limestone is uniform in quality as excavated, with 95 percent $CaCO_3$, and is relatively soft, which contributes to excellent performance of crushing and grinding equipment. Some selection is required in excavation and it is sometimes necessary to strip off small amounts of high magnesium stone.

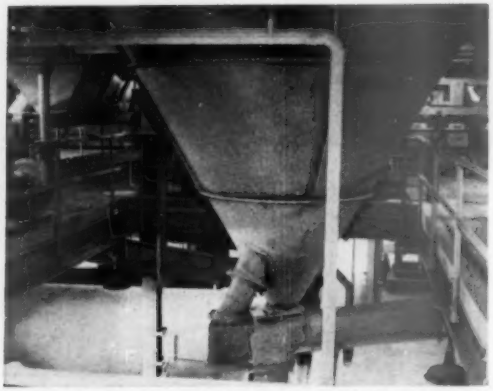
As part of a broad program by Lehigh a few years ago, involving modernization of all its quarries, steam equipment was displaced at Mason City in the fall of 1947. Drilling is done with 6-in. blast-hole drills, and 3-cu. yd. Marion electric power shovels load stone into end-dump Autocar gasoline-powered trucks.

The crushing plant was built originally for skip-car charging and was not changed with the introduction of truck haulage, since it is laid out for efficient handling of stone and clay into the old covered storage building. As a result, the quarry trucks haul no more than nine tons of stone to a load, in order to transfer into Easton skip cars at the foot of an incline. These cars are elevated on rails by cable hoist to trip automatically into the primary crusher.

Primary reduction is through a 36-







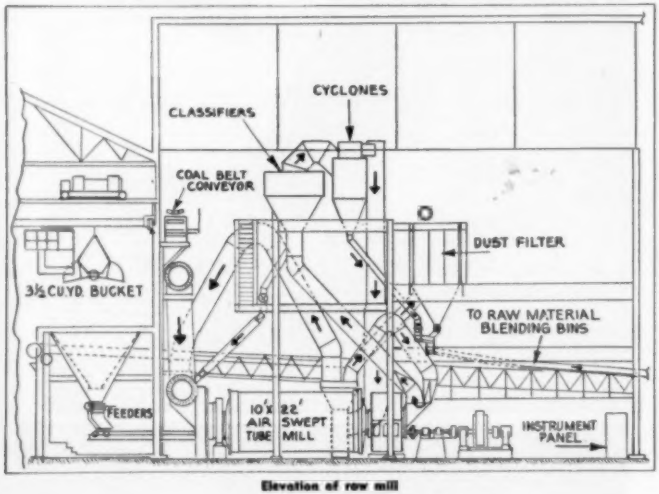
Left: Discharge end of one of raw mills is shown here; mill is driven by 900-hp. synchronous motor at right. Right: Mechanical air separator in secondary finish grinding circuit is fed oversize from preliminary circuit classifiers, also secondary mill stream. Shown here is airslide handling. The one on right conveys from primary circuit to join air separator fines to be conveyed by airslide to cement pumps. Reject spout on left

Two airslides below are from pulverized raw material storage bins, delivering material into elevator for transfer into blended material bins. Note continuous sampler which is - means of testing material being delivered for elevation into bins

in. McCully gyratory crusher, and the crusher discharge is put directly through a Dixie hammermill by pan feeder and pan conveyor. Output of the hammermill, with a top size of 1½ in., is delivered directly by belt conveyor into the storage shed. A Norblo automatic bag-type dust arrestor was recently installed to collect dust from points of feed and discharge in the crushing plant, discharging the dust on to the belt conveyor.

Two sources of clay are excavated, one of which is on the high silica side and the other on the low side. They are mixed by loading a predetermined quantity of each into cars which are delivered to the plant by diesel-electric locomotive. After being put through rotary dryers and a disintegrator, the blend of clays is put in storage by belt.

This warehouse-type building is 992 ft. in length and provides storage for 35,000 tons of limestone and 50,000 tons of clay. In reclaiming for feed into the old raw mill building, the reclaiming belt under the limestone storage and the one under the clay storage were run in opposite directions to a central point, for transfer to an inclined belt conveyor. The direction of travel of the limestone reclaiming belt has been reversed for draw-off of both materials separately to a new enclosed belt conveyor near the stone crushing end of the storage building. Rehandling by draw-off belt conveyor intermixes the materials as placed into storage and contributes to evening off of variations in the stone and the clay.




Elevation of raw mill

## New Storage Facilities

Enroute to the new covered storage building, the stone is given a third size reduction through a tertiary crusher. The belt discharges over a single-deck vibrating screen in closed circuit with a hammermill for a reduction to ½ in. top size. Another belt conveyor carries the stone into storage in the new building. Clay is by-passed in the screen and crusher. By reducing the top size of the stone to ½ in. (conventional practice has been ¾ in.) smaller grinding media can be used in the raw grinding mill for more effective grinding.

Covered storage for limestone, clay, clinker, gypsum, coal and pyrite are under a single roof, with a clear span of 80 ft. in the main storage area. Materials are handled within the main storage areas, and into live storage bins, by 7½-ton Shepard overhead traveling cranes with 3½-cu. yd. Blaw-Knox buckets. Live storage bins are within the area in a row, to serve the raw and clinker grinding mills. Design and construction are almost identical to the Fordwick, Va., installation (See ROCK PRODUCTS, August, 1950, pp. 136-144).

At the end of the structure nearest

the kilns, storage is provided for 70,000 bbl. of clinker. Limestone storage is 3500 tons, clay storage is 1800 tons and 700 tons of storage for pyrite is provided. A sufficient supply of raw material is thus available for three days of operation.

Thirteen live storage bins are arranged in a single row along one side of the structure and adjoining the new mill building when the grinding mills are fed directly from the bins. Adjoining the finish mill section, with its two identical primary grinding circuits, there are six bins, consecutively, for mortar cement limestone, gypsum, clinker (2), gypsum and mortar cement limestone. Capacities of each bin are 29 tons for limestone, 36 tons for clinker, and 21 tons for gypsum.

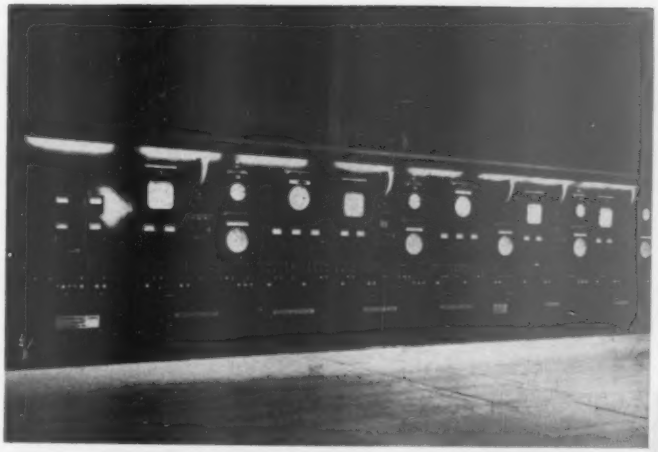
A seventh bin holds 10 tons of coal from which a stoker-fired hot-air furnace is supplied, which delivers heated air into the raw mill grinding circuit. Then follow six bins which supply the two raw mill grinding circuits. For each circuit there is a pyrite bin (24 tons), a limestone bin (44 tons) and a clay bin (23 tons).

In connection with the new storage facilities, new handling equipment was constructed (similar to Fordwick) for rail-delivered materials. A 24-in. inclined belt conveyor delivers into the storage area. Coal is transferred into a steel bin from which a Jeffrey vibrating feeder regulates the flow to a 24-in. KVS belt conveyor delivering into the bin serving the hot-air furnace and carrying on to the kiln building. The kilns are fired with natural gas when it is available, or, alternately, with pulverized coal from direct firing mills.

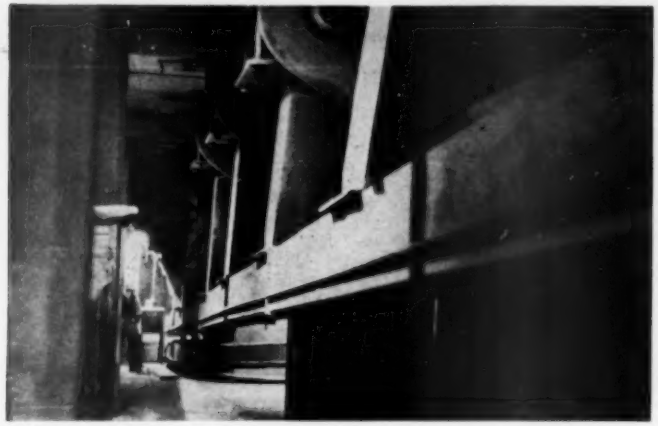
## Raw Mill

Raw grinding is accomplished in two identical Kennedy (KVS) closed circuit grinding systems. The equipment and its operation are the same as the setup at Fordwick, Va., except for some differences in details. Each circuit consists of a 10- x 22-ft. air-swept, integral-gear-driven tube mill, through which heated air is drawn carrying the mill product to overhead air classifiers. Rejects are returned into the feed end of the mill, and the fines and the air are put through cyclones where the finished product is settled.

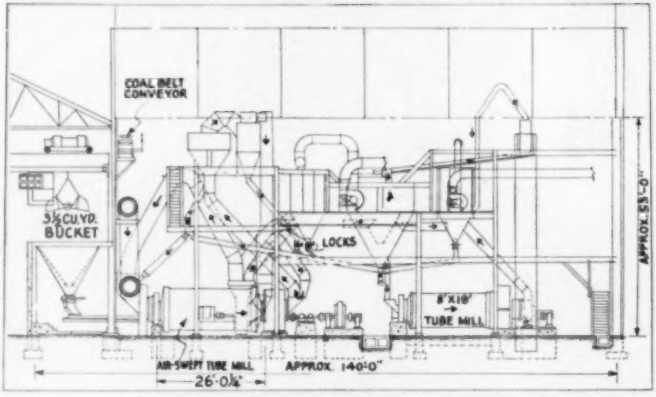
Each mill draws its feed from a combination of three of the live storage bins previously described, holding limestone, clay and pyrite. These bins have very steep sloping hoppers and the feed from each is regulated by a Shaffer poidometer. These feeders are interlocked electrically to maintain a predetermined proportion of the separate raw materials being fed into a



**Top: All controls and instruments for both raw grinding and finish grinding are centralized on this one master instrument panel. Center: This view shows one of raw grinding mills, also exhauster for the second mill circuit. Bottom: One of the bag-type dust collectors at feed ends of kilns**



Below storage bins for ground raw material, withdrawal is by rotary feeders to airslides for elevation and distribution into blended material bins. Airslide here is under one row of five bins; the one below is from under the parallel row of five bins. Feeders are driven through clutches from line shaft and material is drawn from selected bins simultaneously to effect desired blend




Elevation of clinker mill

mill. A similar arrangement of these proportioning feeders regulates the flow of clinker and gypsum into the finish mills.

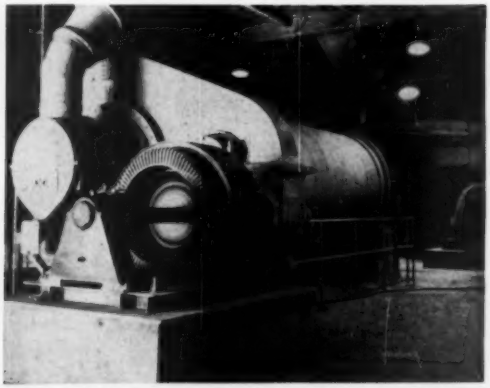
Heated air for drying is supplied both grinding circuits from a hot air furnace fired by an Iron Fireman stoker. Each mill carries a grinding charge of some 60 tons of forged steel grinding balls roughly 2 in. in size.

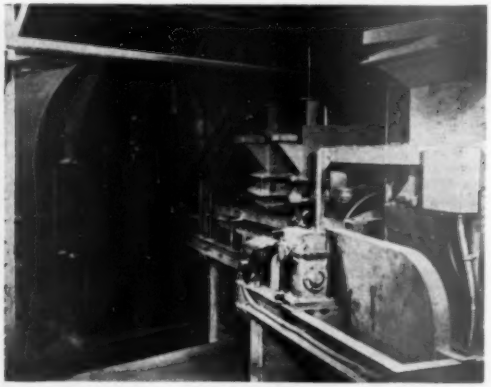
Classifying liners are used in all the mills, which consist of a series of short frustums (of a cone) with the larger ends facing toward the feed ends of the mills. This design of liner (it was described in detail in ROCK PRODUCTS, April, 1938, pp. 44-46) causes the larger grinding balls of the load to concentrate at the feed end, where they should be, and the balls to grade themselves downward, according to size, toward the discharge end of the mill.

In charging balls into the mills, a barrel-full is elevated by a power lift truck and the balls are released into the mill at the discharge trunnion. No attention need be paid to the ball sizes in charging.

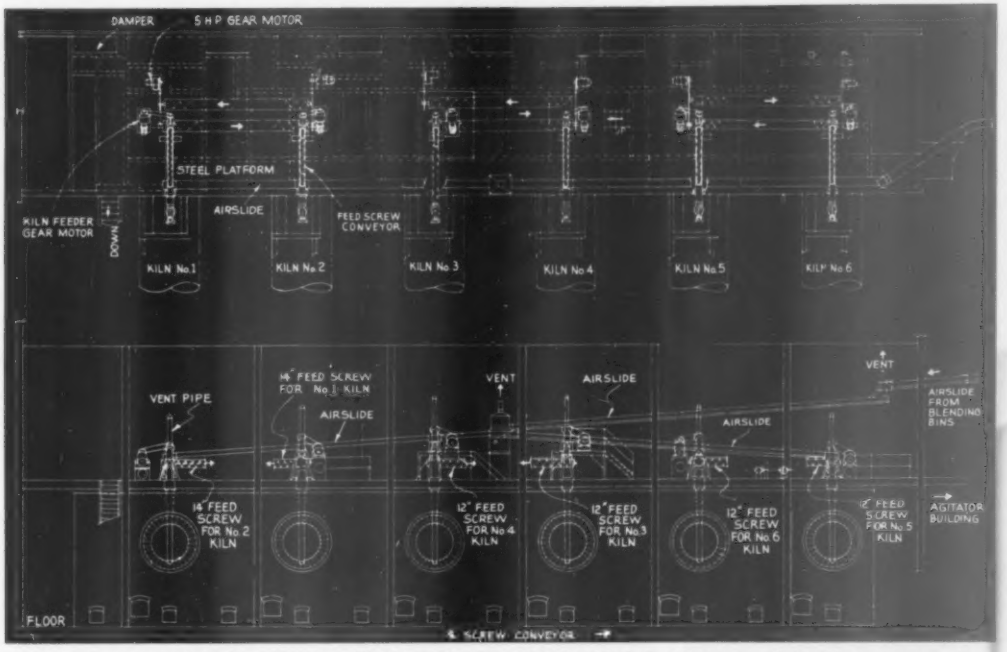
Mills are driven at 20 r.p.m. by 900-hp. (80 percent p.f.) Electric Machinery Mfg. Co. low-starting torque 4160-volt synchronous motors. Magnetic clutches are used at Fordwick to drive identical mills but in this plant, the mills are direct-connected through two stages of gearing consisting of a high-speed pinion driving an intermediate large gear on the shaft from which a pinion engages the mill gearing. The reduction is 600 to 20 r.p.m. This drive is preferred because of its simplicity and lower maintenance, and no difficulty has been experienced in starting the synchronous motor and building it up to speed under full load.

Each mill has its shell insulated against heat loss by an outer covering of 2 in. of mineral wool which is metal encased. All piping in the sys-





Left: One of the two secondary finish mills showing mechanical air separator in background. Three spouts at air separator are (left to right) to deliver fines to cross airslide, to return rejects into mill, and to deliver fines from primary circuit to cross airslide, which conveys cement to pumps. Right: Clinker and gypsum proportions are controlled as fed into finish mills by feeders shown here, which are wired electrically to maintain the desired ratio of each material




**Kiln feed system features airslide for delivery from blended material bins and transfer into inclined feed screws. Horizontal screw conveyors then deliver material to individual feed pipes**

tem is insulated with asbestos covering. The exhauster is driven by a 250-hp. synchronous motor through flexible coupling.

Heated air drawn through the mill carrying pulverized raw material is divided, in each of the two circuits, to enter through the bottoms of two 9-ft. 6-in. radial flow adjustable classifiers where a separation is made at the desired fineness. Rejects are released through a rotary air lock into a spout for return to the feed end of the mill and the air stream carrying the fines from each classifier is drawn through two 5-ft. 6-in. diameter cyclones in parallel.

Product settled in the cyclones is discharged through rotary air locks into a 14-in. F-H airslide which transports the output from both grinding circuits to the raw grind storage and blending building where the stream is elevated and put into bins. The cyclones are vented, in each grinding circuit, through a Norblo bag-type dust arrestor and the dust discharges into the airslide.

In this type of grinding circuit, care is exercised to minimize cold air infiltration and there are a number of adjustments possible to control sizing by the classifiers. Raw material is fed the mill through a gravity trap which restricts the inrush of cold air. Provisions are made for the use of recirculated air, and the admission of additional air through dampers, if needed, to supplement the carrying capacity of the air stream.

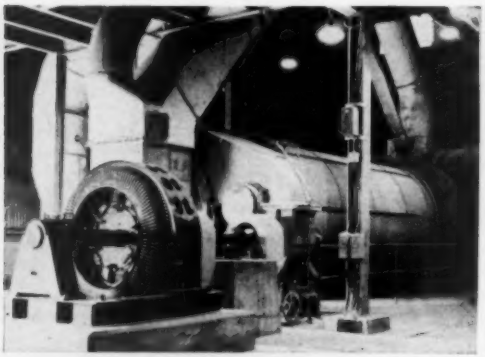
Vertical rods in the air classifiers are the means to regulate the throat opening which is closed down in order to produce a finer product; conversely, it is opened up to produce a coarser product. An annular ring may also be moved up or down to regulate size of product. A third adjustment is through operation of a damper to permit the entry of additional air into the reclassifying zone—the more air admitted through this damper, the coarser the product and the smaller the amount of rejects. Air in the system is returned through piping to the exhauster.

Operation of the furnace is automatic to compensate for variations in the moisture of the raw material. When the moisture content increases, the heated air requirement is proportionately greater. Such variations in moisture reflect on the temperature of the air stream leaving the mill as measured by a recording thermometer at the discharge end of the mill.

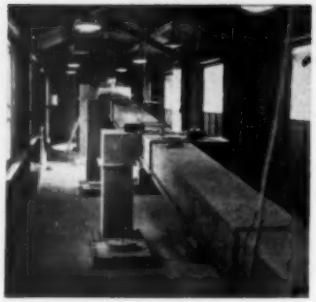
If the temperature at this point decreases, which means increased moisture, a damper in the vent line automatically opens wider so that more air is put through the air filter which increases the suction so that more heated air will be pulled through the furnace.

Adjustment of the stoker is manual, to maintain a certain firing rate. Gases from the fuel bed are tempered by cold air admitted through openings in the furnace, which has a control thermometer at the furnace discharge as the means to maintain a constant temperature range. At the low point of the established range, the stoker automatically cuts in; it cuts out at the higher figure. For an average moisture condition, air is drawn through the mill at approximately 400 deg. F. in order to hold the temperature to a desired 170 deg. F. coming out of the mill. A thermometer at the outlet from the mills holds this temperature constant through automatic adjustment of the previously mentioned air valve. If the

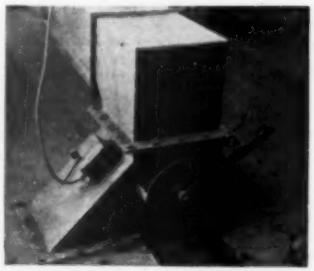
**Vent pipe for airslide delivering blended raw material over to kiln building for distribution to feed screw conveyors**



Shown here is one of the insulated air-swept raw mills. The product is swept overhead by heated air for classification and rejects return into the mill. Drive is 900-hp. synchronous motor



Raw mill product is elevated (background) and distributed into bins (10) by airslide as shown here



Here is shown the valve for directing pulverized raw material from airslide into either of two bins. This is terminus of airslide which also delivers to any of eight other bins

mills are stopped for brief periods, the air is vented rather than shut down the furnace.

Fineness of the product discharging from the mill depends upon the air current put through the mill which is measured by a mill differential gauge, and a damper is the means of adjustment to maintain the established gauge reading. The previously mentioned article on the Fordwick plant describes operation of the mill level control available with this system, and on page 140 of that article a diagram shows in detail the mill flow and operation of the various adjustments and controls. A grinding circuit is designed for a circulating load in the neighborhood of 350 percent. Output per mill is 42 t.p.h. of raw material ground to 91 percent minus a 200-mesh sieve. This is about 10 percent in excess of the production with similar equipment at Fordwick where the limestone contains considerable chert. The limestone at Mason City is so soft that a set of hammers in the hammermills will last from 9-15 months. Power requirement is 7 kw.-hr. per bbl. (610 lb.). Coal consumption averages about 200 tons per month for the hot air furnaces. The exhauster fan with its 250-hp., 4160-volt motor is operating under nearly full load. Pressure on the fan is about 10-in. w.g.

All controls and gauges for operation of the mills in both the raw grinding mill and finish grinding mill are centralized on a single KVS master panel board which also has the instruments for operation of the hot air furnace and the F-K cement pumps and their individual air compressors. Principal instruments are of Bristol manufacture and, for a raw mill circuit, include principally the recording thermometer for mill discharge temperature control (recording), ammeters for the fan motor and dust arrestor motor, mill differential pressure (draft gauge), the dust arrestor inlet temperature control, mill motor power meter (kw.) and recorder, starting switches, indicating lights for all related equipment. There are similar instruments for each primary circuit in the finish mill and, for each of two finishing mills, there are principally ammeters for the mill motor, dust arrestor, elevator and mechanical air separator. Clinker is ground with two stage closed circuit grinding.

### Blending-Storage

In rebuilding this plant, great stress was placed on quality control, particularly in the building of storage and blending bins that would have adequate capacity and sufficient flexibility to permit blending to a uniform holding point. A system of double blending using airslides and enclosed bucket elevators for transfer between bins was designed, and continuous samplers are used to check incoming material and the blended feed material as released for delivery to the kilns.

Storage is in ten bins consisting of two parallel rows of five bins. Capacity of the bins, which are rectangular in construction, is 300 tons of material each which is sufficient to produce 1000 bbl. of clinker. In addition to these bins, there are six blended material bins arranged in two rows of three. Together there is capacity to produce 16,000 bbl. of clinker or the peak output of the kilns for almost three days. Between the two banks of bins are the enclosed bucket elevators for handling mill-run material up to the top of the bins, transfer of blended material to the top of the blended material bins and to elevate kiln feed material to be transported over to the kilns.

Output of the two raw mills is conveyed by a 14-in. airslide over to the storage building and discharged into the boot of a concrete-encased bucket elevator to be raised to the top of the bins. Transfer overhead is into a 14-in. airslide which extends over the double row of five bins. Gate valves are manually opened according to the bin to be filled on either side.

A sample of incoming material is taken by a continuous sampler of Lehigh design while filling a bin. It is not practical to take a continuous representative sample from an airslide so a transfer is made into a short length of screw conveyor fitted to the airslide, just before the material flows into the main bucket elevator. When a bin has been filled, an average sample of its contents has been taken from which analyses of oxides, $C_3S$, MgO and silica ratio are made.

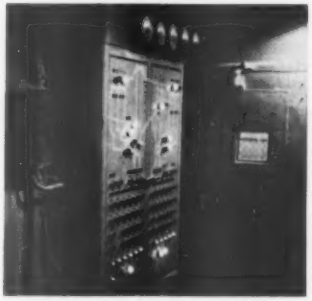
A control panel on the ground floor indicates by lights where the stream of incoming material is going throughout the system. Bin-dicators set several feet below the tops of the separate bins flash a light on the board and sound a warning to the operator, who then goes above via a passenger elevator to close the valve and open another to a different bin. A bin is never selected for filling until it has first been drawn empty. Each is numbered, and the draw-off for blending is entirely under the control of the chemist.

Blending is done in the simultaneous transfer of material from a combination of bins, by airslide and bucket elevator to the blended material bins. Under each of the ten storage bins there are two Fuller rotary feeders, driven through clutches engaging a single line-shaft with variable speed drive. Two parallel airslides convey the material into a bucket elevator, and overhead airslides deliver into any selected blended material bin. Any combination of bins may be drawn from in making the transfer and the amount from any bin may be varied by operating one or two feeders. Bin-

dicators on these airslides sound an alarm in the event the airslides fill up, in which case the operator will stop the feed. Both banks of silos and their elevators have Norblo bag-type dust collectors and, in each case, the dust is put back into one of the bins.

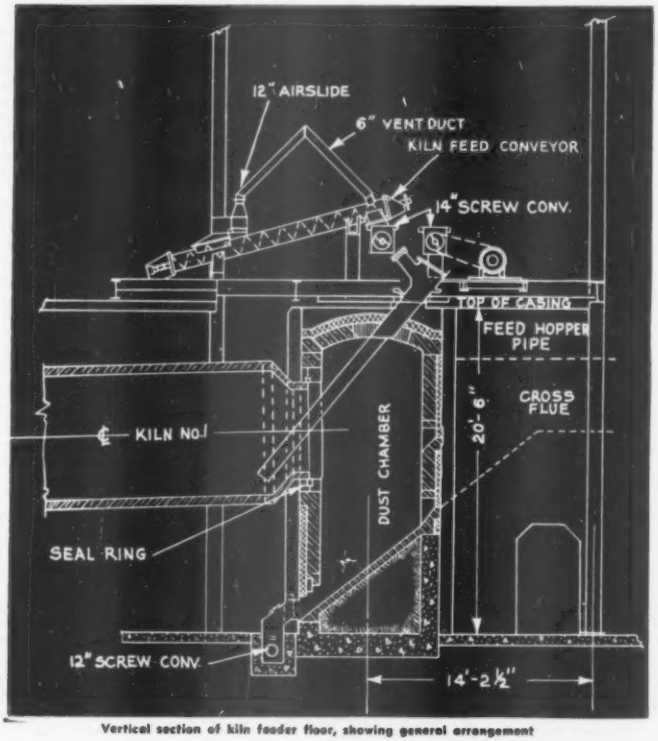
### Kiln Feed

By a similar draw-off arrangement using airslides, material is withdrawn from a minimum of three blended material bins simultaneously and elevated for transfer over to the kilns. Through an ingenious application of the airslide, the blended material bins serve also as kiln feed bins. At the head of the elevator, transfer is made into a 14-in. airslide, 140 ft. in length, which is one of the "water level" type which is run completely full of material. Since the airslide is the source of supply, without bins, to six rotary kilns, it is necessary that it be run completely full of material which necessitates that a large excess be made available to it. This is done through use of an overflow weir in the housing near the point where the elevator transfers into the airslide. Any material that the kilns cannot absorb thus overflows into one of the blended material bins. The kiln feed airslide has a 15-hp. motor drive on the Buffalo blower supplying it with air, whereas airslides of similar cross section for other applications require only a 7½-hp. blower drive.



Control panel in pulverized raw material storage building; passenger elevator for operator is in background

A sampler draws a continuous sample from the hopper at the point of transfer from the elevator into the airslide. Analyses of the kiln feed are made on a regular schedule around the clock. The airslide is vented through a pipe which is similar to a standpipe, with open top. A kiln feed level indicator on the airslide will sound an alarm if the airslide is not continuously full of material.




Vertical section of kiln feeder floor, showing general arrangement

As shown in the accompanying drawing, this main airslide is split to two legs and from each leg three kilns are fed. Feed is drawn from the airslides, at each kiln, into an inclined feed screw conveyor. At the junction, a V-shaped pipe vents the airslide and discharges into the head of the feed screw. Each inclined feed screw conveyor transfers into an open-top horizontal 14-in. "deaerating" screw conveyor, returning dust into the conveyor near the discharge end.

As another part of the rebuilding program, open gear-train drives on all the kilns were replaced with G.E. 75-hp. gearmotor drives. The drives have a speed range of 50 to 100 r.p.h. and the kiln speeds are maintained at 75 r.p.h. Drives are tied electrically to the inclined feed screw drives through power selsyns.

### Kiln Operation

Practice is to make firing adjustments to the kilns by varying the speed of the kilns rather than to change the firing rate. This is preferred to varying the fuel rate because it is considered simpler for the burners and to be more of a safeguard against secondary combustion in the boilers.

All six kilns exhaust to a common flue from which the gases divide to five waste-heat boilers with economizers which, in turn, exhaust through another common flue of large cross sectional area. The exit gases are cleaned through a new Cottrell electrical precipitator which is a 3-unit collector of the pocket electrode, rod curtain type. It is rated at 240,000 c.f.m. gas capacity and designed for a collection efficiency of 95-96 percent at 400-500 deg. F. The precipitator is operated under pressure, with three draft fans on the suction side of the waste heat boilers.

### Stack Dust

Dust from the dust chambers, the boiler housings, flues and the dust collector is all recovered as kiln feed material and the system of handling is rather unique. Gathering screw conveyors are the means of transfer of dust from all these sources to an elevator filling a bin. Two 5-in. Fuller-Kinyon pumps transport the dust from this bin back to the feed ends of the raw grinding mills. An estimated 9 percent of the raw material stream is dust being circulated.

### Waste Heat Power

Gases enter the waste heat boilers at 1600 deg. F., which is a much higher temperature than that for the kilns when operated by the wet process. Exhaust temperature at the stacks is approximately 300 deg. F. The plant has always been self-sufficient in power and generated 100,000 kw.-hr. per day when operating four wet process kilns. With six kilns to be operated, and proportionate increased power

load together with more special cements to be manufactured, the generating capacity was increased with installation of a new 7500 kw. (9375 kv.-a.) G.E. turbine-generator. Power is generated at 4160 volts as required for the large synchronous motors for the grinding mills and a transformer steps down the potential for the other motors. The new unit is sufficient to meet requirements but the old 550-volt, 4000-kw. generator is retained in service for reserve and standby. Power requirement is 22 kw.-hr. per bbl. of cement manufactured, covering all operations from quarrying to the packing of cement. Raw grinding and finish grinding consume 7 kw.-hr. and 11 kw.-hr. per bbl., respectively. Capacity to produce electrical power is 150,000 kw.-hr. per day which is in excess of plant requirements.

### Clinker Grinding

Clinker is ground into cement through a 2-stage, closed circuit grinding arrangement which is in duplicate. The primary circuits are identical to the raw grinding circuits with the exception that no heated air is used, and consist of 10- x 22-ft. air-swept tube mills in closed circuit with air classifiers, which are followed by cyclones to trap the fines. Clinker and gypsum are proportioned by interlocked Shaffer poidometers.

Fines from the cyclones in each circuit, and the extreme fines from the dust collector venting the air classifiers, are fed into the secondary mill by airslide. Secondary mills are 8- x 18-ft. KVS tube mills of the integral gear type driven by 450-hp. motors which are in closed circuit with separate 16-ft. Sturtevant mechanical air separators. The mill stream is transferred by airslide into a bucket elevator and an overhead airslide feeds the air separator. Rejects from the air separators are fed back into the mill. Fines from both mechanical air separators are transported by airslide to discharge into the hoppers of two 7-in. Fuller-Kinyon pumps which transport the cement into storage. Each pump has an individual Fuller C-200 air compressor. Cooling air is drawn through the air separators by separate Norblo dust arrestors. Continuous samples of the cement are drawn from a screw conveyor attachment to the airslide just ahead of the cement pumps.

Production of the combined grinding circuits is 320 bbl. per hr. Cement could be ground through the single-stage, closed circuit primary circuit alone but at reduced capacity. By using the air-swept grinding circuit for the primary grinding, it is possible to introduce heated air into the system to dry the limestone when manufacturing mortar cement.

### Packing of Cement

Cement is stored in the various sections of a 500,000-bbl. storage warehouse. As stated earlier, open-top airslides are the means of placing the cement into storage with a minimum of dust. The storage building is separated into three divisions lengthwise with packing stations between.

A new packing station was installed between two of the three storage areas, or bins, and it also features the use of airslides. The existing screw conveyors are the means of drawing out cement from the two long storage bins. There are three parallel screw conveyors under each bin, which convey the cement to the packing station. Any of the six screw conveyors can discharge into either of two enclosed bucket elevators, one of which is for bulk loading and the other to fill four overhead bins of 400 bbl. capacity each. Airslides with electrically-operated side-discharge valves are the means of filling the respective bins, which are equipped with high level indicators.

Open-top airslides in the hoppers of these bins, fed by Fuller variable-speed rotary feeders and followed by a common airslide, are the means of transfer to a bucket elevator for elevation to the tops of the packing machine bins. Here again, the "water-level" type of airslide is used, this time to fill two packing machine bins, after passage first over Selectro vibrating screens. The airslide is completely filled with cement, like the one carrying kiln feed material, and the excess cement is circulated back by airslide into the bin from which it was drawn. Cement is packed by two 4-tube St. Regis packing machines which have automatic cut-offs. A wire mesh conveyor carries the bags of cement to the railroad cars for loading.

This new packing station is served by a bag-type dust arrestor and is an extremely flexible packing arrangement. A bin could be in process of being filled with one type of cement, while packing another type and loading still another type as bulk cement simultaneously.

A. J. Johnson is superintendent of the plant and B. H. Walter is chief chemist. Roy N. Young is vice-president and operating manager, and W. M. Harbaugh is chief engineer, both with headquarters at the company's main offices in Allentown, Penn. Other mills of the company are located at Alsen, N. Y.; Birmingham, Ala.; Buffalo, N. Y.; Cleveland, Ohio; Fogelsville, Penn; Fordwick, Va.; Iola, Kan.; Metaline Falls, Wash.; Mitchell, Ind.; Oglesby, Ill.; Ormsrod, Penn.; Sandt's Eddy, Penn.; and Union Bridge, Md. Walsh Construction Co. was contractor for the Mason City project.

## Phosphate Development

CONTINENTAL SULPHUR AND PHOSPHATE CORP., Dallas, Texas, has contributed an additional $40,000 to the Natural Resources Research Institute of the University of Wyoming for continued research and studies of the Lander phosphate deposits. This brings the total financial assistance given to the university by Continental to $50,000, according to a recent report in the *Wyoming State Journal*.

Studies of the phosphate deposits in the Lander area, with a view to commercialization, were started in 1945 when Senator Hunt, then governor of Wyoming, recommended the establishment of, and approved, the first state appropriation of $28,000 to the Research Institute. Later, he interested the Chicago and North Western Railway, the Bureau of Mines and the Wyoming State Department in the project and secured an additional $15,000 for initiating exploration and studies of the deposit. The Continental company holds the lease on a portion of the phosphate land in the Red Canyon area.

## Cement Scarcity on West Coast

ACCORDING TO A RECENT REPORT in *The Wall Street Journal*, the shortage of cement on the Pacific Coast is growing progressively worse. Cement stocks in the nation as a whole, at the end of March, 1951, were approximately the same as a year ago. However, in California, which is the second largest producing area and has the highest per capita use of cement, stocks were down 25 percent. Several contractors have brought in cement from Utah and Arizona to supplement the supplies available in California. This imported cement costs $.50 per sack, or $2 a bbl., to ship in, bringing the total cost to around $5.65 to $5.75 per bbl. by the time it is delivered on a job.

The cement shortage in northern California is said to be the most critical since the building boom began in 1945. The shortage assumed serious proportions about a year ago when major producers in northern California put allocation programs into effect. It was expected that the usual winter building slump would provide an opportunity to build up inventories, but an unexpected dry spell in March and April resulted in an increase in building which depleted stocks built up over the winter months. Expanded military and industrial construction have contributed to the increased demand of cement in this area.

In the Pacific Northwest, the most urgent demands for cement have arisen from the big hydroelectric projects on the Columbia river and atomic energy installations in Washington.

The West's scarcity of cement was said to be basically due to a population increase of 50 percent in the last ten years, and a construction increase of 245 percent, while overall production capacity of the coastal plants at the end of 1950 was only 17.5 percent above that of 12 years ago.

# How Temperature and Moisture Changes May Affect the Durability of Concrete

By S. L. MEYERS*

EXCLUDING HEAT OF HYDRATION in recently placed concrete, the thermal effects of temperature differences in concrete may be divided into four possible classifications as follows:

(1) The effect of changes on the aggregate alone, many being non-uniform in composition, or made up of dissimilar crystals, as a granite, where each kind of crystal may have a different rate of thermal expansion.

(2) The effect of changes on the cement paste; the magnitude of expansions of hardened cement paste varies with relative humidity and age.

(3) The expansion of the *mortar-cement* matrix (paste plus sand or fine aggregate) and the stress set up at the contact of paste and fine aggregate due to differences in thermal coefficients of the two materials.

(4) The expansion of the concrete, considering the concrete to be made up of coarse aggregate and mortar (assuming the mortar to expand as a one-component material) and the thermal stress set up at the contact of mortar and coarse aggregate. The coarse aggregate-mortar bond appears to be very important in resisting stress, due to thermal dissimilarities between the two materials.

## Effects of Aggregates

Many of the physical properties of concrete are more closely related to the quality of the paste than they are to the aggregate, but this is not true of thermal properties. These are contributed to about proportionally as to the solid volume of each constituent of the concrete, and since the average concrete contains approximately 75 percent (*1*) of aggregates by volume, it can readily be seen why the thermal properties of the aggregate are important in any consideration of thermal problems of concrete.

Aggregates are mainly derived from igneous and sedimentary rocks, occasionally metamorphic rocks such as quartzite and marble. Igneous rocks vary from glassy with no evidence of crystalline structure, then fine-grained, dense felsites to coarse-grained granites and massive-grained pegmatites. The fine-grained felsites are considered to be almost thermally stable. Coarse-grained granites and rhyolites will have more stress at crystal boundaries during a temperature change because of the unequal thermal expansions of adjacent dissimilar grains. Such rocks often weather easily, as exemplified by the frequent occurrence of decomposed granite washes in high, dry altitudes, where the temperature variation between day and night is rather extreme. Where such rocks are protected by cement paste under normal temperature variations their durability is often very good.

Both sizes of crystals and thermal coefficient of expansion of different kinds of crystals will affect the stress at crystal boundaries for a given change of temperature and for a given modulus of elasticity of the crystals.

Griffith (*2*) points out that magnitude of thermal expansion in rocks is often related to percentage of silica present, being highest with a high silica content; furthermore the silica is most effective in increasing the coefficient when in its free form as quartz, chert, sandstones. When silica is combined with other elements these combined silicates have lower coefficients. He also shows that there is some relation between thermal expansion rate and alumina content. While it is true that usually silica rocks have high coefficients, granites, basalts and dolomites, medium coefficients and limestones and marbles low coefficients, these vary over a rather wide range, as the following examples will show.

**Table I. Condensed from a table of thermal expansion of rock concrete and portland cement (3)**

| Kind of Rock | Observed Range in Mean Linear Thermal Expansion Coefficient x $10^{-6}$, deg. F. |
|---|---|
| Granites and rhyolites | 1.0 to 6.6 |
| Diorites and andesites | 2.3 to 5.7 |
| Gabbros, basalts, diabase | 2.0 to 5.4 |
| Sandstones | 2.4 to 7.7 |
| Dolomites | 3.7 to 4.8 |
| Limestones | 0.5 to 6.8 |
| Cherts | 4.1 to 7.3 |
| Marbles | 0.6 to 8.9 |

The coefficient of some crystals with axes in different directions and sometimes of different length varies with the direction of the axes. Parsons and Johnson (*4*) report 4.1 x $10^{-6}$ along one quartz axis, and 7.5 x $10^{-6}$ along another. With calcite it is 14.3 x $10^{-6}$ in one direction and a negative 2.8 x $10^{-6}$ perpendicular to the first axis. Orthoclase in feldspar is another mineral having markedly different coefficients along different crystallographic axes.

It is possible that a group of discrete calcite crystals in random positions separated by cement paste can develop considerable thermal movement and stress between two crystals, where an expanding face is adjacent to a contracting face. Souder and Hibert (*5*) have shown that some rocks exhibit a continuous gain of length when undergoing repetitions of temperature alternations. This gain of length decreases in magnitude with time, but does persist to some extent as long as tested.

In the case of sedimentary rocks consisting of grains cemented together, some thermal stress could be set up between the grains and the cementing medium. Here again, the magnitude of the stress for a given temperature change and modulus of elasticity would depend upon the size of the grains and the differential coefficients of the constituents.

A high modulus of elasticity resists the movement induced by the stress applied to a body more than a low modulus, resulting in less accommodation to the applied stress. For a given thermal strain less cracking and disintegration can be expected with aggregates of low modulus of elasticity.

One other property of concrete aggregates that is of importance in thermal changes is diffusivity, or the facility with which temperature changes are distributed. Thermal diffusivity is that value of the conductivity divided by the product of the specific heat times the density. The following rocks are named in the order of their increasing diffusivity: basalt, rhyolite, granite, limestone, dolomite and quartzite (*6*).

## Cement Paste

In considering the effect of thermal changes on hardened cement paste, we find that it does not behave as do most crystalline solid bodies, which have a constant thermal coefficient of

*Chief chemist, Southwestern Portland Cement Co., El Paso, Texas.

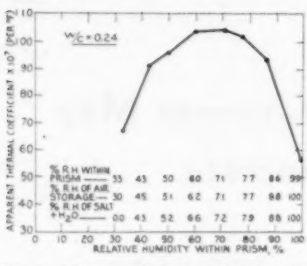



**Fig. 1: Influence of degree of drying (in terms of relative humidity) on the apparent thermal coefficient of neat prisms stored in air having different constant relative humidities at 70 deg. F. for four months**

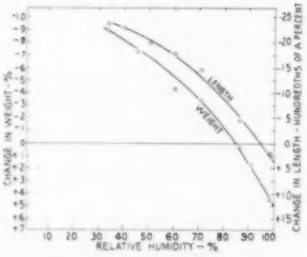



**Fig. 2: Length and weight change of prisms made from the same paste, but stored at different humidities (the curves represent the change in weight or length from their initial condition at the time of being taken from molds and before being placed into controlled air storage)**

expansion (at a given temperature), but that the apparent thermal coefficient of expansion is a variable. This had been suggested by Freysinnet, a conclusion arrived at from his studies of volume changes in cements due to moisture changes, temperature changes and creep, as being related by the voids and moisture state within the cement, or concrete, to the hygrometric state of the air (*7*). Meyers (*8, 9, 10*) showed that the linear thermal coefficient of hardened cement paste varies with its age, chemical composition and state of moisture. Powers (*11*) showed that this could be expected from theoretical considerations and suggested that this apparent thermal coefficient is made up of two movements: the true kinetic thermal movement plus a movement due to swelling pressure. Bonnell and Harper (*12*) confirmed Meyers' results that the coefficient of pastes is at a minimum in both a wet and a very dry state and at a maximum at some relative humidity between these extremes. Meyers (*10*) showed that this maximum coefficient was near to 70 percent relative humidity for relatively young pastes, and at a somewhat lower relative humidity for aged pastes; also the maximum coefficient for aged pastes was less than for younger pastes. (See Figs. 1 and 2).

Since the true thermal coefficient of the paste can be assumed to be a constant, the reduction of the apparent thermal coefficient of pastes with age is due to a reduction of potential swelling pressure. And since the source of the potential swelling pressure is within the colloidal cement gel, this indicates that there is a conversion of cement gel to a microcrystalline or crystalline, form of material with time. This is also indicated by a reduction in the specific surface of the paste with age. In the following table is is assumed that the water vapor adsorbed at relative humidity 43 percent is related to the amount of gel (surface area) present.

**Table II**

| Age of hardened cement paste. Made from Type I cement, mixed with 24 percent water | Evaporable water adsorbed at 43 percent relative humidity (percent of original cement) |
|---|---|
| 1 year ..... | 4.80 |
| 2 years ..... | 4.40 |
| 14 years ..... | 2.45 |

The free surface energy (surface tension) of solids is a great deal more than in the case of liquids. This coupled with the enormous surface area present in cement-gel (*13*) suggests that there is present considerable force striving to reduce the surface of the gel and increase particle size, but restricted by the rigidity of the gel; however, over a long period of time and because of volumetric movements within the gel some decrease of gel or reduction of surface area would be expected.

Doelter (*14*) in discussing colloidal minerals, says "only a limited number of compounds have the property of enduring as gels for a long period; the majority soon become crystalline." S. Giertz-Hedstrom (*15*) in discussing the physical structure of hydrated cements, says "the cement gel is in its colloidal form not a final stable product, but must, by gel coarsening and crystalline growth, go the same way as other inorganic colloids in nature."

The following characteristics of hardened cement paste with respect to apparent thermal coefficients have been shown to exist (*9, 10*):

The coefficient is at a maximum at about 70 percent relative humidity within the paste. It is at a minimum in a water-saturated paste. It also approaches a minimum when in a very dry state; that is, with most of the evaporable water removed.

The apparent thermal coefficient, as well as its range of variation, decreases with the age of the paste (Fig. 4) even though it be a favorable humidity to produce a maximum coefficient. This favorable humidity itself drops below 70 percent and approaches 50 percent relative humidity in very aged pastes.

The chemical composition and fineness of the cement affects the coefficient of a hardened paste only by the manner in which it affects the quantity of gel present in the paste and the paste structure, its rate of hydration, or hygrometric state.

There is a relation between volume changes resulting from humidity changes, and range of variation of apparent thermal coefficient. Materials having large moisture volume changes show large variations in thermal coefficients. Both movements are the result of the same cause, changes in the potential swelling pressure acting in Kelvin's law of vapor pressures (see Fig. 5). (Some of the test results shown are for non-cementitious materials).

The presence, or quantity, of air voids present in the paste has little effect on the coefficient.

The thermal coefficient of autoclaved cement pastes is a constant, indicating the absence of cement gel after autoclaving (see Fig. 3).

Liquids that do not have a great affinity for cement gel, or with molecules too large to enter the gel pores, do not affect the thermal coefficient of the paste, that is, it remains a constant for a given temperature. Such liquids which have been tried to replace water in cement paste without effect are alcohol, glycerine, benzene and kerosene.

Some other materials, which are not cementitious, but have either a fine pore structure approaching the diameter of the pores of cement gel, or have a great affinity for water, exhibit swelling pressure and a variable apparent thermal coefficient of expansion. There is some relation between the moisture volume changes of both cement pastes and these non-cementitious materials and the range in variation of their coefficient of expansion.

Concretes have a smaller range of variation of apparent thermal coefficient than neat pastes. Their coefficient is the result of the volume-quantity and coefficient of the aggregates and paste. The coefficient of the aggregates is a constant for a given temperature (for each kind of aggregate); only the paste introduces a variable coefficient, and this as with neat pastes is a maximum at 70 percent relative humidity so that the con-

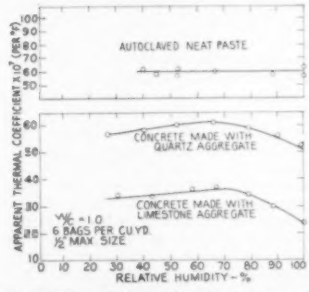



**Fig. 3: Effect of degree of drying (in terms of relative humidity) on the thermal coefficient of autoclaved neat paste and two different kinds of concrete**

crete's maximum coefficient is also at 70 percent relative humidity.

## Cement-Sand Mortars

Mortars consist of cement paste and sand or fine aggregate. They are equivalent to concrete without coarse aggregate. Assuming that all other factors affecting thermal stress at the contact of paste and sand particles are constant, the stress developed will be proportional to the length of paste-sand contact, and since the maximum size of aggregate is much smaller in mortar than in concrete, the stress will not assume the same importance as in concrete and the likelihood of failure is much less. In Table VI, the mortar slabs were sound and strong after 18,000 cycles of temperature alternations. Cement paste has a higher thermal coefficient than most concrete aggregates. Mortars, having more paste than concrete, usually have a coefficient in between that of paste and concrete, but the effect of the thermal coefficient of the fine aggregate is reflected, to a considerable extent, in the coefficient of the mortar: limestone sand mortars have low coefficients and siliceous sand mortars have high ones.

Callan (*16*) shows the effect of differences in coefficients of thermal expansion of coarse aggregate and mortar in concretes on durability as exhibited in accelerated freezing and thawing. Where the difference in coefficient between mortar and aggregate is small, as in the case of both fine and coarse limestone aggregate, durability is good; when this difference is large, as in limestone coarse aggregate and siliceous fines, the durability is poor.

In this test it appears a little difficult to evaluate each destructive factor separately, either freezing and thawing or unequal thermal expansions, since both occur during the test period.

## Creep in Mortars

Creep, or flow, is the deformation or strain in cement paste, mortar or concrete due to sustained load or stress. When the stress is relieved none, or only part of the deformation, is recoverable or elastic. Creep probably occurs only in the gel of cement paste and not in the aggregates (*17*), and is believed by some to be connected with a movement of water in cement gel (*18, 19*). The stress/creep relation decreases with age.

Creep has the same effect in reducing stress as a reduction of modulus of elasticity. With time, it relieves some of the stress at the contact of paste or mortar and aggregate caused by unequal thermal expansion.

How effective creep is in preventing failure in concrete is not definitely known, but that it is of much help is proved by calculations which often indicate the presence of more than sufficient stress to cause tensile failure in concrete without this happening (*19*).

Willis and De Reus (*20*) show the following results in tests of creep in cement mortars:

The above table fails to evaluate specific bond, but does indicate that bond increases with the roughness of solid surface and with porosity. The pore suction, which is dependent upon pore size, voids and extent of dryness

**Table III. Plastic flow of mortar under stress of 1680 p.s.i. for one hour**

| Parent Material | | Plastic Flow of Mortar, units x $10^{-6}$ per unit | | |
|---|---|---|---|---|
| Type | Modulus of Elasticity x $10^{-6}$ | Mix (abs. vol.) 1:2.4 | 1:3.6 | 1:3.6 |
| | | w/c ratio 0.7 | 0.7 | 0.85 |
| Chert | 14.4 | 24 | 30 | 40 |
| Quartzite | 6.7 | 36 | 50 | 38 |
| Chert | 6.8 | 30 | 56 | 52 |
| Limestone | 11.2 | 40 | 35 | 56 |
| Limestone | 6.0 | 58 | 60 | 92 |

Some further tests showed a more definite trend for creep to be inversely proportional to modulus of elasticity.

## Extensibility

Creep, elasticity and tensile strength are factors in the extensibility of concrete. Extensibility is the ability of concrete subjected to tensile stress to withstand deformation without cracking. Hatt and Mills (*21*) report about 0.00015 to 0.00018 unit extension before visible cracking starts but microscopic cracking may start at 0.00004 unit extension in extensibility tests of concrete. Savage (*22*) reports some elastic, plastic and total deformations on extensibility of concrete due to sustained tensile loads:

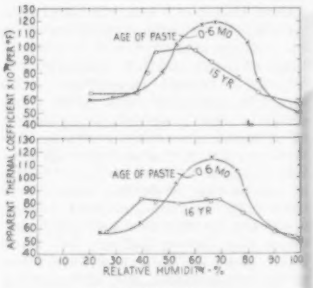



**Fig. 4: Effect of age**

**Table IV**

| Load p.s.i. | Age, Days | Type I cement Elastic Deform. | Type I cement Plastic Deform. | Type I cement Total Deform. | Type II cement Elastic Deform. | Type II cement Plastic Deform. | Type II cement Total Deform. |
|---|---|---|---|---|---|---|---|
| 100 | 40 | 2.8 | 0.7 | 3.5 | 1.7 | 0.9 | 2.6 |
| 200 | 80 | 3.9 | 1.8 | 5.7 | 3.0 | 1.9 | 4.9 |
| 300 | 120 | 5.5 | 2.0 | 7.5 | 4.6 | 2.6 | 7.2 |
| 400 | 160 | 8.1 | 3.7 | 11.8 | 6.9 | 5.7 | 12.6 |

Both of the above concretes failed in this progressive loading test at 417 p.s.i. The deformations are cumulative and expressed in inches per inch x $10^6$.

## Bond in Concrete

The strength of bond in concrete is the result of specific adhesion (chemical and physical attraction between contacting materials), tensile strength of the cementing medium, and mechanical bond. The latter depends upon the roughness of the bonding surfaces and the facility with which the plastic cementing medium enters the pores of the solid surface. The following Table V indicates the effect of roughness of surface and porosity of solids on bond.

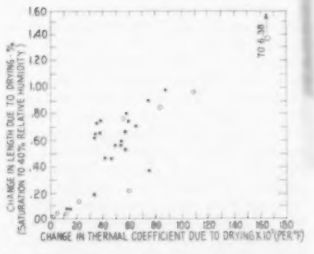



**Fig. 5: Comparison of shrinkage due to drying with change in thermal coefficient due to drying**

**Table V. Adhesion of cement paste to some solids, after two weeks curing in a moist atmosphere and testing by direct pull**

| Kind of solid surface | Percent voids in solids by volume | Adhesion or bond strength |
|---|---|---|
| Smooth glass | practically none | 20 p.s.i. |
| Rough glass | practically none | 170 p.s.i. |
| Medium burned tile | 12.5 | 330 p.s.i. |
| Hard burned tile | 7.0 | 300 p.s.i. |
| Rough copper | practically none | 160 p.s.i. |
| Rough brass | practically none | 150 p.s.i. |
| Very rough iron | practically none | 200 p.s.i. |
| Polished iron | practically none | 20 p.s.i. |
| Sandstone, as broken | 2.6 | 180 p.s.i. |
| Sandstone, as broken | 8.1 | 240 p.s.i. |
| Sandstone, as broken | 15.8 | 280 p.s.i. |

of the solids, has been found by Palmer (*23*) to be an optimum at some pull which varies for different kinds of mortar. Aggregates with relatively large amounts of pores smaller than five microns have shown poor durability, Sweet (*25*). Possibly one factor is that mortars find penetration difficult in such fine pores which act as a screen, leaving the mortar solids on aggregate surfaces while water alone penetrates the pores, and bond strength does not reach a maximum.

It is possible that adverse weather conditions may seriously reduce bond strength while not affecting the strength of the paste or of the aggregate. Davis, Brown and Kelly (*24*) report that bond strength is greatly reduced by freezing and thawing or by wetting and drying with alternations of high and low temperatures. Under favorable conditions bond strength increases with time. This could be due to growth or extension of colloidal cementing material into voids, as occurs with autogenous healing. Possibly there is some movement of contacting materials relative to each other, in bond without failure occurring, as witness slip of reinforcement long before failure, but more likely there is not actual separation of the two surfaces, only deformation of materials adjacent to contact. The methods used to measure slip reinforcement would not show this.

### Restraint in Concrete

Restraint is that which opposes free movement. It exists when one part of a body is held fixed, or partly immobile, or when one part of a body moves, contracts or expands at a different rate than other parts of the body. The ground offers restraint to a concrete footing, wall or floor placed on it. Reinforcement offers restraint to the concrete in which it is embedded, at the same time, the concrete also offers restraint to the reinforcement. Aggregates offer restraint to the movement of mortar in concrete. If all of the components of a concrete had the same thermal and moisture volume change rates, with perfect diffusivity of moisture and temperature, and excluding external restraint, there would be no restraint, no stress and no cracking, only strain and uniform volume change. Such an ideal condition cannot be attained. Even well hydrated cement paste develops stress within itself. Some crystalline bodies are present and often some unhydrated clinker residues. Parts of the paste have different moisture and thermal properties than others; a moist core will offer restraint to a drier surface, etc. Powers (*26*) has calculated that a single monomolecular shell of water around each cement gel particle will cause a swelling volume change of 16 percent. Actually, an extreme moisture volume change of paste is only about 2 percent. This indicates that even cement gel contains within itself bodies or conditions which restrain the free movement of the gel.

Cracking results when sufficient stress is applied to a restrained body to overcome its strength. In the case of concretes, mortars and pastes, this is nearly always tensile strength, as this is much less than compressive strength or shear.

Some of the factors favorable to preventing bond failure and cracking in concrete are creep, low modulus of elasticity, autogenous healing, high tensile strength, extensibility. Cold working, or the repetition of stress below 50 percent of ultimate, has been suggested by some writers as another favorable factor. Below is shown how the most important conditions connected with thermal bond failure are affected in turn by other factors.

| Extensibility | Bond Strength | Stress |
|---|---|---|
| Varies with kind of cement and kind of admixture, if any, in cement<br>Creep aids extensibility<br>Extensibility increases with age | Type of cement<br>W/C and quality of paste<br>Curing and age<br>Mechanical bond-roughness of aggregate surface and volume and size of pores<br>Autogenous healing and growth, with humidity<br>Chemical and physical stability of cement and aggregates<br>Size of aggregate; large aggregate is more critical because of $\frac{\text{surface area}}{\text{cross section}}$ ratio | Range of temperature change<br>Rate of temperature change<br>Differences in thermal coefficient of expansion between different constituents of the aggregate, between aggregate and paste, or between coarse aggregate and mortar<br>Modulus of elasticity; low values decrease stress<br>Creep relieves stress<br>Restraint; prevents stress from being relieved |

**Table VI. Tests for thermal compatibility between mortars and aggregates (as exhibited by condition of bond at contact after being subjected to 18,000 cycles (225 days) of alternations of temperature from 75 deg. F. to 135 deg. F.; time per cycle, 18 min.)**

| Kind of Aggregate in Slab | Linear Coefficient x $10^{-6}$, deg. F. | Tensile Strength Paste—Aggregate Bond, p.s.i. | Condition of Bond at Contact at End of Test: Limestone Mortar | Quartz Mortar | Condition of Aggregate at End of Test |
|---|---|---|---|---|---|
| Pyrex glass | 18 | 0 to 20[1] | poor | OK | cracked |
| Quartz | 70 | 300 | edge cracks | OK | OK |
| Iceland spar | + 139 ⁂<br>— 31 ⁂ | 0 to 20[1] | poor | OK | cracked |
| Granite | 35 | 310 | OK | OK | OK |
| White limestone | 27 | 220 | OK | edge cracks | OK |
| Rhyolite | 40 | 400 | OK | poor | OK |
| Sandstone | 67 | 410 | OK | OK | OK |
| Vycor glass | 4 ⁂ | 0 to 28[1] | poor | poor | cracked badly |
| Gray limestone | 26 | 290 | OK | edge cracks | OK |
| Chert | N.D. | 120 | OK | OK | OK |
| 1 Cement: 2 Limestone | | 41 | | | OK |
| 1 Cement: 2 Quartz | | 68 | | | OK |
| Neat cement paste | | 55 to120 | | | OK |

Note: ⁂ taken from textbooks.

[1]Some bond present, but too small to measure accurately in tensile machine.

Slabs of aggregate from 2 to 3 in. square and ½ in. thick were cut from rocks by means of a masonry saw. In the cases of Vycor and Pyrex, watch glasses of these materials were used.

The mortars used consisted of one part cement to two parts sand by weight. One mortar containing limestone sand was placed about ¼ in. thick on one flat surface and two sides of each slab of aggregate, and the other mortar, containing both graded and 20- to 30-mesh Ottawa quartz sand, placed on the remaining surfaces of each slab.

After curing a few days, the test pieces were sealed in copper foil and placed on a revolving wheel which subjected them to changes of temperature.

At the same time that the test pieces for temperature cycles were made, identical control test pieces were made and stored in moist air of 100 percent relative humidity and 70 deg. F. At the end of test these were examined and all found to have good bond, except limestone-mortar-and-Pyrex was fair, and also gray limestone-and-limestone-mortar was only fair.

**Table VII. Effect of repeated cycles of alternate heating and cooling on durability of concrete prisms made from aggregates with wide range of thermal expansion**

| Kind of Aggregate | Linear Thermal Coefficient x $10^{-6}$ deg. F.: Aggregates | Concrete 60 days | Concrete 545 days | Length Changes in Percent: 1600 Cycles 28 days | 7800 Cycles 136 days | 25,800 Cycles 545 days | Conditions at End of Test at 25,800 cycles, 545 days: Compressive Strength p.s.i. | Surface Appearance |
|---|---|---|---|---|---|---|---|---|
| Coarse & fine limestone | 27 | 29 | 28 | .00 | + .05 | + .08 | 5760 | OK |
| Coarse limestone and Ottawa sand | | 37 | 40 | + .05 | + .01 | + .35 | 5980 | Checked |
| Coarse quartz and fine limestone | | 40 | 43 | + .02 | + .21 | + .22 | 5930 | Checked |
| Coarse & fine quartz | 57 | 60 | 62 | + .01 | + .05 | + .26 | 4050 | Checked |
| Coarse & fine andesite | 35 | 37 | 36 | — .04 | — .05 | + .03 | 6670 | OK |
| Coarse & fine rhyolite | 40 | 37 | 43 | — .01 | + .11 | + .36 | 3660 | OK## |
| Coarse & fine porphyry | 49 | 46 | 42 | — .02 | — .01 | — .02 | 6660 | OK |
| Coarse flint and fine limestone | 37 Flint only | 40 | 38 | + .01 | + .02 | — .01 | 5800 | OK |
| Coarse limestone and fine flint | | 37 | 28 (wet) | + .02 | .00 | + .03 | 6350 | OK |
| Coarse fused silica and Ottawa sand | 3 | 29 | 40 | + .34 | + .55 | + .58 | 2190 | Badly Checked## |

Note: ##Dull sound when struck.

Concrete mix is 1:2½:3 using Type I cement and a ¼-⅜-in. grading for coarse material with screenings used for fines.
Mixing water sufficient to produce about a 1-in. slump.
Bars molded in standard autoclave prism mold. (1 x 1 x 11.6 in.).
Each prism sealed in a copper foil jacket of 0.002 in. thickness.
Accelerated test in heating and cooling by attaching prisms to the rim of a bicycle wheel and rotating about one revolution in 25 min., passing the prisms through water at 70 deg. F. and heated air at 175 deg. F. for the first 7800 cycles. The last 18,000 cycles were at a rate of 18 min. per cycle.
Measured prism temperature was 75 deg. F. low and 140 deg. F. high for the first 7800 cycles and 75 deg. F. low and 135 deg. F. high for the last 18,000 cycles.

**Table VIII. Effect of different humidity conditions. (Some concrete test prisms were made and subjected to cycles of temperature alternations to determine the effect of different humidity conditions accompanying thermal changes)**

| Kind of Aggregate | Condition of Prisms Before Thermal Cycles | | Condition of Prisms After 18,000 Cycles of 60 deg. F. Range of Temp. Change | | |
|---|---|---|---|---|---|
| | Percent R.H. | Coefficient x $10^{-7}$ | Percent R.H. | Coefficient x $10^{-7}$ | Change in Length, percent |
| Quartz for coarse<br>Limestone for fine | 40 | 58 | 15 | 55 | — .01 |
| Same | 66 | 61 | 40 | 55 | + .03 |
| Same | 100 | 48 | 82 | 51 | + .06 |
| Limestone for coarse<br>Quartz for fine | 40 | 46 | 80 | 43 | — .02 |
| Same | 56 | 47 | 96 | 45 | + .03 |
| Same | 100 | 43 | 100 | 38 | + .21 |

Remarks:
All of the specimens were sound at the end of test. The larger gain in length of the last prism is probably due to its more humid condition. The humidity conditions were not well controlled, as leaks developed in the copper foil jackets of the prisms which allowed moisture to enter in some cases while the prisms were immersed in cooling water, or loss of moisture during the hot air part of the cycle.
In this case where the test piece size required using a small maximum size of aggregate, the above results, together with those described in the text, indicate that continuous repetitions of temperature changes, if not over an extreme temperature range, or if the thermal coefficients of the different constituents of the concrete are not too dissimilar, does not have a very destructive effect on concrete. More destructive thermal effects are noted in the case of using flat slabs covered with mortar.
Mortars by themselves, because of the short range of interfacial contact of fine aggregate and cement paste, do not develop as much thermal stress as in the case of concrete where the contact surface between a piece of coarse aggregate and the surrounding mortar covers a larger area.
While purely thermal volume changes alone might not be very harmful to concrete durability, there is nothing in the above that can indicate the effect of thermal changes in combination with or in addition to moisture volume changes and mechanical stresses applied to concrete.

## Concrete Durability

In the freezing-and-thawing test, stresses are developed from both temperature changes and from hydraulic pressure. In the "Scholer Test" (*27*), stresses are developed from wetting and drying as well as from temperature changes; in neither of these tests are the results due to thermal stress alone.

In the experimental method, the results of which are described in Tables VI, VII, VIII, temperature changes alone are involved, and the conditions of the test pieces at the end of the experiments are due to thermal stresses alone and are not masked by other stresses, except, possibly there was a small amount of moisture volume change in some cases where the test pieces were not perfectly sealed.

In Table VI, containing test results on aggregate-slabs coated with two kinds of mortar and subjected to cycles of temperature change, the poor showing of both Vycor and Pyrex glasses appears to be due to weak tensile strength in bond and low thermal coefficients (*28*). While the bond was weak, it must have been strong enough to transmit sufficient thermal stress from the mortar to the glass aggregate to cause cracking in the aggregate.

The poor durability of Iceland spar (calcite) is due to poor bond strength, the presence of cleavage planes in the calcite and unequal coefficients of expansion along different crystal axes.

Edge cracks between aggregate and mortar appeared in only three cases: quartz-aggregate and limestone-mortar, and in both gray and white limestone-aggregate with quartz-mortar. In all three cases there is a considerable difference between the thermal coefficients of the aggregate and the mortar contained in each of these concrete prisms. Exceptions to this are the good durability showings of quartz-mortar with Pyrex glass and Iceland spar. Cement paste alone and both kinds of mortar alone were very durable in this test.

Table VII shows thermal coefficients, changes of length, compressive strength and surface appearance of concrete prisms after many cycles of temperature change. Where all aggregates are of the same kind for both coarse and fine, the results are generally good; an unexplainable exception is surface checking on coarse and fine quartz aggregate. The large linear expansion and poor compressive strength of the coarse and fine rhyolite concrete prisms is probably due to its mineral composition of large thermally dissimilar crystals. The very poor behavior of the prism fused-silica coarse aggregate and Ottawa sand (quartz) for fines could be due to the large difference in thermal expansion between fused-silica and quarts, or between fused-silica and quartz-cement-mortar, and to poor bond resulting from the glassy surface of fused-silica.

In Table VIII the concrete prisms were similar to the prisms tested in Table VII, where quartz and limestone aggregates were used, but it was hoped to keep the cement paste at different but controlled relative humidities, to evaluate the effect of the variable thermal coefficient of cement paste at different relative humidities. This was not completely achieved. The range of temperature in each cycle and the number of cycles were less than in the tests described in Table VII. All test pieces were in good condition at the end of the test.

While the number of test pieces involved in the thermal cycling experiments was small, and the new information gained not as much as desirable for such an important and extensive field, yet some tentative conclusions are indicated: considering the severity of this thermal test, the rapid alternations of high and low temperatures over 18,000 to 25,800 cycles, and some of the combinations of aggregate and paste designed for a maximum of thermal incompatibility, the durability of the concrete under these adverse conditions is rather surprisingly good, and indicates that thermal incompatibility alone of aggregates and of aggregates-and-cement-paste may not contribute a great deal to lack of concrete durability. However, in combination with moisture volume changes or with mechanical stress the effect of thermal stress might be more severe on concrete durability than is shown here.

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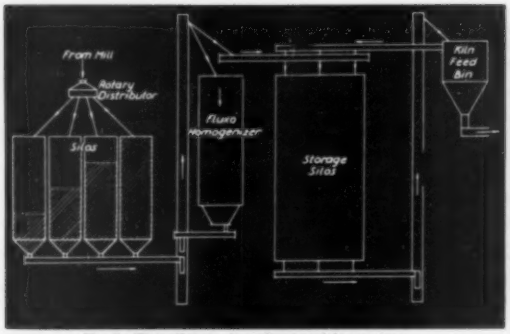



Fig. 1: Discontinuous type homogenizing system

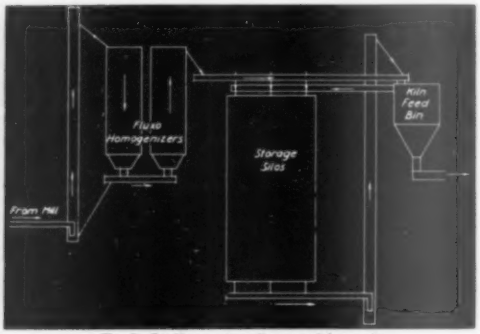



Fig. 2: Continuous type homogenizing system

# AIR BLENDING OF MATERIALS FOR DRY PROCESS KILN FEED

By NIELS NIELSEN*

IT IS WELL-KNOWN how even small deviations from the correct composition of a cement raw mix may have important undesirable effects on the burnability of the material, reflecting on economy of kiln operation as well as uniformity of product. Therefore, the importance of obtaining the best possible perfection in blending and homogenization of the raw mix cannot very well be overestimated.

One of the main reasons for the predominance of wet process plants compared to dry process plants is the comparative ease with which the raw slurry in a wet process plant can be blended and homogenized to the proper composition in mixing tanks when using mechanical or air agitation or a combination of both.

In the case of dry process plants, it is far more difficult to obtain a complete uniformity of the raw mix, because the raw material is not as easily adaptable to blending as is the slurry. Even the greatest care in batching the components of the dry raw mix and in circulating it through numerous silos—as was the old fashioned way of blending—will not result in a fully satisfactory homogenization.

Great progress was made in this respect when it was discovered that dry and finely pulverized material will behave like a fluid when it is mixed with air introduced under a certain pressure at the bottom of a bin containing the material.

Based on this discovery, the so-called "Fluxo Homogenizing System" was developed more than 25 years ago, and during all these years it has been applied and has been in satisfactory operation in numerous dry process cement plants. The expected benefit in better homogenization has been obtained, and it has proved possible to keep the unavoidable fluctuations in the composition of the raw mix within limits which allow for good kiln operation and a uniform clinker product.

The Fluxo homogenizer consists of a cylindrical steel or concrete mixing tank through which the material to be homogenized passes. In the center of the tank is located a vertical shaft with horizontal agitator arms driven through gears at the top of the tank. Inside the cone-shaped bottom of the tank is provided means for an even distribution of the compressed air for aeration. The air is introduced here and forced upwards through the material, loosening the contacts between the particles so much that the material becomes movable as a liquid and can be subjected to agitation and mixing by the rotating stirring device.

As a special feature in the design of this stirring device might be mentioned its arms, which have an elbow-joint at a certain distance from the shaft in order to make it possible to start homogenization when the tank is being filled with unaerated material, thereby saving aeration and stirring during time of filling. After addition of air, the stirrer is started in a direction of rotation opposite to the usual direction with the result that a folding of the arms shortens their effective length sufficiently to enable the start of rotation. After a moment the resistance against rotation is lowered so much that the direction of rotation can be reversed and the arms straightened out to their full length.

Generally speaking, air homogenizing systems have fallen into two groups, one using air agitation only, and one using the combination of air and mechanical agitation. The Fluxo homogenizer belongs to the second group, and it is considered as one of its advantages that the mechanical agitation ensures a better blending than when only aeration is used, because the agitator arms will cut the vertical channels into which the air otherwise might segregate without effecting sufficient blending.

Not all raw materials are equally easy to homogenize by means of air, because they differ in physical char-

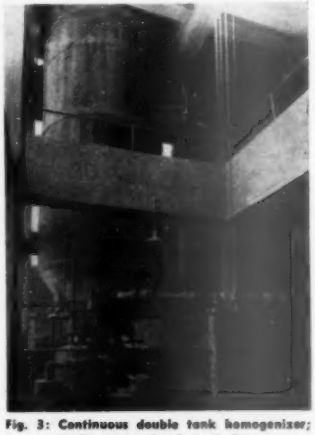


Fig. 3: Continuous double tank homogenizer; tanks are made of steel plate

*Engineer, F. L. Smidth & Co., Copenhagen, Denmark.

acter and do not make the same resistance against fluidization. The fluctuations in the chemical composition of the components of the raw mix also have some bearing on the question of which kind of homogenization system should be adapted in each single case. The stricter the requirements are—both in respect of physical and chemical properties of the materials—the more important it is that sufficient circulation and movement of the material is effected. For this reason and based on many years experience, the air agitation in the Fluxo homogenizer usually has been supplemented by mechanical agitation. On the other hand, it has also been proved that the mechanical agitation can be omitted when the properties of the materials allow it.

The Fluxo homogenizers are either of the batch type with intermittent filling and homogenizing or of the continuous type with a constant flow of material through the homogenizer. Each of the two systems, the discontinuously and the continuously working, has its field of application. The last-mentioned is the cheaper in installation costs, but is limited to use in cases where each of the components of the raw materials has a rather constant chemical composition or where intervals of fluctuations are very short so that only small adjustments of mill feeders are needed involving only small oscillations in the composition of the mill product, particularly its lime content.

The Fluxo homogenizer can be hooked up in several ways to existing or new silos and conveyors, depending on local conditions. A typical layout of a discontinuously working Fluxo homogenizing system is shown schematically in Fig. 1.

Between the mill and the Fluxo homogenizer are arranged four silos, each one of the same volume as the homogenizing tank. The raw material from the mill is evenly distributed to these silos by means of a rotating distributor, and at a certain time one silo is filled to a quarter of its capacity, one silo to one-half capacity, one silo to three-quarter capacity, and one to its full capacity, at which moment the content of the last-mentioned silo is emptied into the Fluxo tank in order to be homogenized. By this arrangement the time intervals of fluctuations in composition of the material will be shortened to a quarter, and the material will be correspondingly easier to homogenize. In case the titration of the mill discharge varies too much over a longer period, silos with correcting material of known high- and low-lime composition may be applied.

After the material has been homogenized in the Fluxo homogenizer, it is conveyed to the storage silos, from where it is taken to the kiln feed bin.

An example of a continuously working Fluxo homogenizing system is shown in Fig. 2. Here the raw mix discharged from the mill goes directly to one of two Fluxo homogenizing tanks, which at the bottom are interconnected through a channel so that the material can flow upwards freely through the other homogenizing tank. The homogenized material leaves the latter tank near its top and from there is transported to the storage silos or directly to the kiln feed bin.

Fig. 3 shows a continuously working double tank Fluxo homogenizer with the tanks made of steel plate.

(Continued on page 192)

Fig. 4: Bottom part of homogenizers, the tanks of which are made of concrete

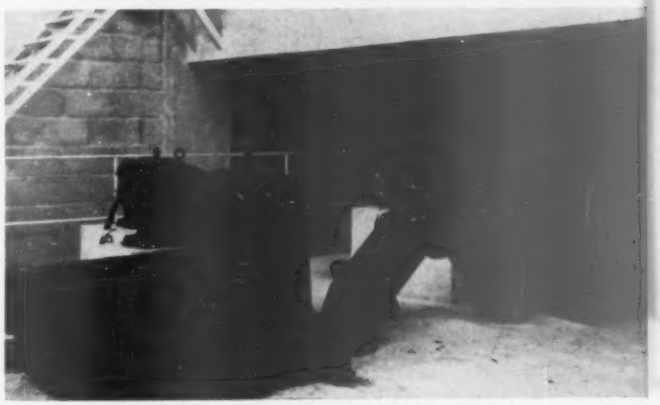


Fig. 5: Driving arrangement on top of homogenizing tanks

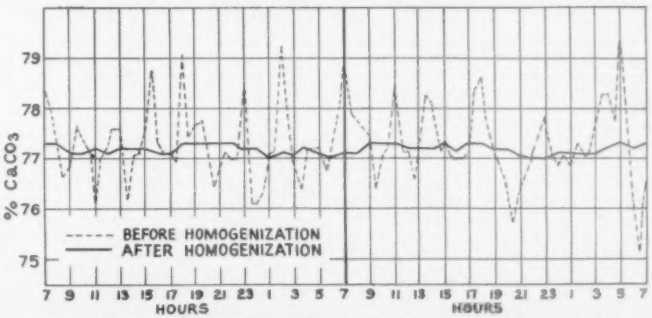
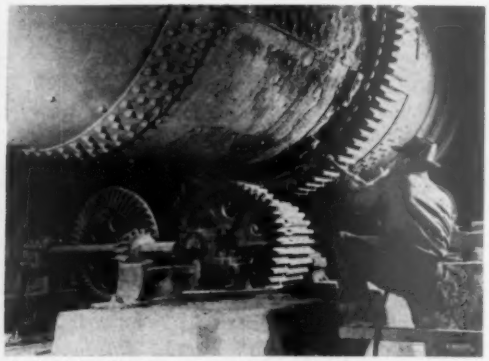



Fig. 6: Operating curves for a two-day run of an homogenizing plant, both before and after installation of an homogenizing system

Workman removing a gear cover from a mill in the raw grinding department with an air tool. It is estimated that 36 hr. are saved on the job of mill gear or roll repair through using air power tools in place of hand wrench and hammer



In the drying department, air tools are used for changing bearings and for removing the master gear of the dryer for repair. For this job an air impact tool with 1⅝-in. socket takes off all 32 1-in. nuts in ten to 15 minutes

The workman is applying eight 1-in. ankle and leg bolts to the casing support of a pulverizer in the finishing department. This takes only five minutes with an air tool, a saving of from one-third to one-half the time usually required with hand wrench and hammer

# MAINTENANCE REDUCED BY AIR IMPACT TOOLS

TRYING TO KEEP UP with the unprecedented demand for cement keeps the machinery of Lehigh Portland Cement Co.'s plant at Fogelsville, Penn., running at full capacity. Under this continuous operation, pulverizer rolls must be changed more often, and breakdowns occur on all types of machinery. Yet down time must be reduced and machines put back into service more quickly than ever if production is to keep pace with demand.

Lehigh Portland Cement Co. has speeded repairs on some machines by introducing air impact tools into the plant for maintenance work. The repair foreman finds that three Ingersoll-Rand air Impactools have saved as much as 50 percent of the time on certain machinery repair jobs—and better on some—with a corresponding saving of money.

The Impactools can be used whenever and wherever nuts or studs must be removed or applied to machinery or trucks in the process of repair. They find application all over the plant—even in the quarry for repairing electric shovels, stone cars and drill machines.

One example of the advantages offered by this type of tool was recently demonstrated: the tool was used to reassemble the ankle and leg bolts of a Bradley 40-in. pulverizer. There are eight 1-in. bolts on this unit, and the Ingersoll-Rand size 534 air Impactool, with 1⅝-in. socket, was used on the job. To run down the bolts took about five minutes—less than a minute each, as compared with about 20 min. by hand. This saving of 15 min., though not a great deal in itself, is extremely significant when multiplied by 56 leg brackets on the 14 mills in the clinker and finishing departments and by additional savings effected throughout other departments of the plant.

For example, the size 534 tool had been used to change a die or grinding ring in the finish pulverizing mill. The complete job of disassembly, changing of the ring and reassembly of the mill took two men three hours. By hand it requires the services of two men working for six hours.

The stone drying department provided another example. Another size 534 air Impactool was removing the 1-in. bolts on the master gear of the dryer. Only one man was needed to operate the tool, and the 32 bolts were removed in from 10 to 15 min., even though some were frozen fast. The air Impactool spun these frozen nuts off as fast as the more mobile nuts, requiring only a few seconds longer to loosen them.

Other applications for air impact tools in this cement plant include repairing master gears of the grinding tube mills, and removing tire bolts to install new tires in the dryers of the stone drying department. It is also used to change the cradle or bearings on the dryers. In the kiln rooms, the air power tools save time in removing and running down nuts in operations connected with gear repair work. In the raw material department, it is frequently necessary to install new rolls in the Hercules mills. There are three mills in this department, and each is kept running 16 hr. a day. At this rate, it is necessary to change the roll heads of the pulverizer about once every four months. Whenever a new roll must be installed, or a pinion shaft or thrust bearing breaks, the gear cover of the mill must be removed. For this job a smaller size tool, the Ingersoll-Rand size 508 Impactool, is used with a 1-1/16 in. socket. Removing the 38 ⅞-in. nuts on the gear cover takes a little over 15 min. with the power tool. It takes more than half an hour by hand.

It is estimated that the air Impactool saves six men each six hours when used to repair a Hercules mill,

(Continued on page 180)

# EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

## Part V. Thermal characteristics of rotary cement and lime kilns

By VICTOR J. AZBE*

BEFORE DELVING DEEPER into the technical and operating problems in connection with rotary lime and cement kilns, it is necessary for us to establish the relationship that exists between these operations. There are great similarities and therefore too few comparisons which, if practiced with due allowances, would prove very helpful. Performance factors as to both volumetric and thermal efficiency could be compared and effects of coolers, quadrants, kiln manipulation and combustion control, interpretation of performance by means of gas analysis, manner of thermal evaluation, and minimization of all the losses is about the same in both cases, requiring but slight modifications.

In almost every respect the rotary cement kiln is subject to the same handicaps as the lime kiln. The problem is not one of generation of heat but of inadequate heat absorption, insufficient recuperation and regeneration, unsuitable flame characteristics, poor and limited exposure of the material to heat, poor heat transfer rate, poor cooler and preheating zone performance and the "thermal overlap," that is, terminal temperature differential between clinkering and calcining, calcining and preheating, preheating and dehydrating zones.

A cement kiln in its principal aspects is essentially a lime kiln. The main difference is that, in the case of cement, for every pound of lime made there is half a pound of argillaceous material coming down the kiln, which at the very end and in a separate kiln section, so to speak, combines chemically and exothermally with the lime to form the combination of components constituting cement clinker.

Argillaceous material passing through the kiln is entirely favorable to the thermal operation, and the exothermic combination reaction is also, so one would expect a cement kiln to be thermally more efficient than the average lime kiln. Therefore, the reasons that this does not tend to be so should be of interest to all cement, lime, and related refractory sinter manufacturers.

### Evaluating Equipment

The tendency in the industry is in evaluating equipment performance by comparing one unit with a preceding unit to the exclusion of comparing it to a more basic, more absolute, standard. Thus a cement kiln requiring 70 lb. of coal per bbl. of clinker is assumed a well performing kiln, but this is only by contrast with kilns that use 100 lb. To those dealing with the matter as thermal analysts, it is still poor and should be unsatisfying.

It is true that the cement kiln is subject to certain handicaps, but to offset them there are inherent advantages. The lime kiln perhaps is less handicapped but neither is it favored by the same advantages. The sinter dolomite and magnesite kilns are likely to be worse off, unless favored by exceptional stone.

In the calculations of cement kiln performance the basic data used by the author are presented by the following tabulation. As to mix and clinker composition it refers to a product of a specific plant. In others there are variations but not sufficient to upset our reasonings presented here very greatly.

### Heat Currents

Fig. 18 is a simplified diagram showing the main heat currents that take place in a cement kiln. For a lime kiln such a diagram is very much the same except that the shaded streams are missing. The heat streams A, B, C and D come from the fuel. That of A is lost through radiation, that of B is too low in elevation to cause calcination and enters the preheater. In effect it is the heat required in heating up the products of combustion and its attendant nitrogen to the calcination temperature plus the thermal "differential" between the calcining stone and escaping gases. C represents heat of calcination, a directly useful stream, and D is the heat necessary for heating up the clinker mass to the temperature prevailing in the kiln. This is helped by stream J, the exothermic heat of reaction generated within the zone where silica, alumina and iron combine with the lime component. It is a stream which contributes enormously in the heating up of the mass and activating the reaction.

In referring to "streams" it should be realized that in this we are not referring to gas streams as such, but to heat streams, a definite although intangible factor, in a way. One could call them "energy streams" as well.

Stream B, not being utilizable for calcination due to its low temperature elevation, can be used only for preheating, dehydration of kaolin, and evaporation of water. In general we may say that what comes down the preheating section is clay and limestone. More specifically we may say it is clay G, lime E and $CO_2$ F. The latter two are temporarily in combination but still two separate entities. The $CO_2$ portion of the limestone requires a certain amount of heat for its preheating, but the $CO_2$ released from the stone in the hot zone reverts that portion of the heat from the bed up the kiln. Therefore the one very closely balances the other as is shown graphically by closed cycle F.

The CaO portion of the limestones on the other hand passes through the kiln. It first gathers heat from the low temperature stream B in the preheating zone as shown by E, and later as lime gathers in further amounts from the high temperature stream D.

All of this heat would be reverted by a fully functioning cooler back into the kiln as heat of air preheat, but since the preheating of air is already fully accounted for by stream B then this exchange for that of B may be considered as heat of high elevation available to the calcination and sintering process at full efficiency and as "useful heat" would join as U composite stream N, determining kiln efficiency.

The same would apply in the case of heat of preheating of the clayey matter, this being stream G, abstracting heat from the escaping gases with further amounts added by D and the whole returned by the cooler, (or should be) as stream I, greatly enhancing the kiln efficiency determining stream N, if not lost through ineffective cooling at K.

A more complete heat stream diagram for a cement kiln is presented by Fig. 19. Again for lime it is the same, except that then the lighter shaded streams are absent. A thermal analyst should properly have a quantitative appreciation of all these streams as much as possible for every location through the kiln. The mere knowledge of conditions at either end of the kiln does not qualify one as a

*Asbe Corp., St. Louis, Mo.

thermal analyst. His striving should be particularly for knowledge and eventual mastery of conditions prevailing at the boundary of all the zones.

In the case of lime, the shaded exothermic stream P and recuperative stream K are absent as shown in Fig. 19. In consequence, the degree of air preheat possibly will be much less and stack temperature more for lime than cement. That in practice the exact opposite is true is for reasons of equipment and operational limitations which we believe can be corrected.

We may express ourselves in still another, perhaps clearer, way. As the clinkering reaction is self supporting, there is no fuel burned in the cement kiln that would be chargeable to the argillaceous matter except for a very slight amount. Virtually all fuel is chargeable to the lime, the calcination reaction. So all fuel and air are for the purpose of making lime. Here the argillaceous material helps in that it absorbs heat from the escaping gases, delivers the heat to the cooler where it supposedly is used in obtaining a higher air preheat for lime. Within this phase the argillaceous material makes out of the cement kiln something comparable to the pebble air heater.

## Waste Gas Temperatures

Figure 20 presents theoretically the possible waste gas temperature for dry lime and cement kilns. That for cement for any particular thermal efficiency is quite lower. The graph is calculated on the assumption that gases in both cases leave the calcining zone at the minimum temperature of 1500 deg. F. Their subsequent cooling will depend on the heat absorbing capacity of the dry product passing down through the preheating zone.

Actually, in the case of rotary lime kilns the escaping gas temperature will be about 600 or 700 deg. F. higher than indicated. In case of cement kilns it may be even more, as much as 1200 deg. F. higher, all due to inability of the rotary to absorb the heat. For cement, this inability to absorb heat is more pronounced by far than in a lime kiln. This diversity in itself proves the importance of our comparing the rotary lime kiln with the rotary cement kiln functions.

Conversion of spent heat of low elevation doomed to be wasted by the stack into heat of high elevation available to the kiln reactions as in the case of this argillaceous material should be taken account of in thermal efficiency equations.

## Kiln Efficiency

The ordinary equation for determining kiln efficiency of both lime and cement kilns, such as would hold good in the overall and which was used to prepare Fig. 20 is:

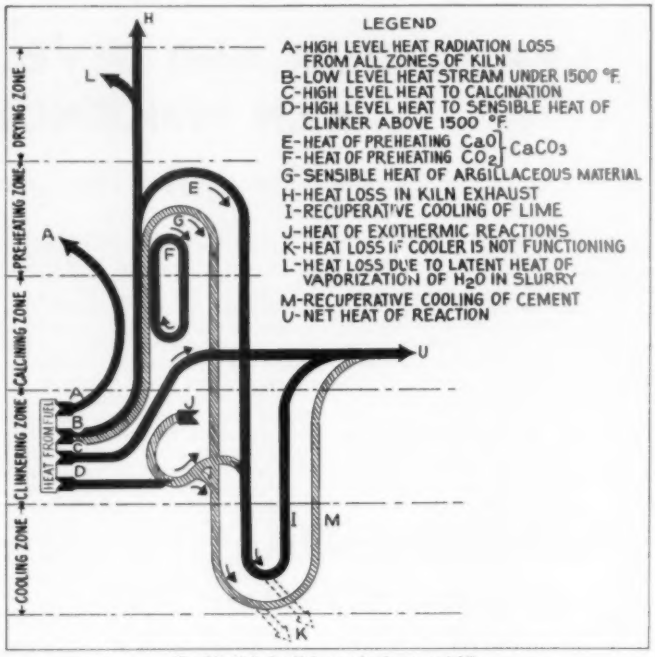



Fig. 18: Main heat streams in the cement kiln

$$\text{Eff.} = \frac{\text{⌀CaO}(1378) + \text{⌀MgO}(1170) + \text{⌀Kaolin}(245) \quad \frac{\text{⌀Lime or ⌀Clinker}}{\text{⌀Fuel}}}{\text{Low Heat Value of Fuel} + \text{Total Heat of Exothermic Reactions}} \times 100$$

But effect on efficiency not in the overall but only within a narrow operating range should also consider recuperative influence of argillaceous material and the equation should be about as follows:

$$\text{Eff.} = \frac{\text{⌀CaO}(1378) + \text{⌀MgO}(1170) + \text{⌀Kaolin}(245) \quad \frac{\text{⌀Clinker}}{\text{⌀Fuel}}}{\text{Low Heat Value of Fuel} + \text{Total Heat of Exothermic Reactions} + \text{Recuperative Influence of Argillaceous Matter}} \times 100$$

We are not saying that the second is right and are merely featuring the effect of this non-lime component, but neither is the first right for not considering it. In the table we have clinker as 67.8 percent CaO and MgO and 32.2 percent non-lime material. Assuming that calcination starts at 1500 deg. F. then the argillaceous material brings to the cooler from the preheating zone 106 B.t.u. for each pound of clinker. Since a fair cement kiln will give 5 lb. of clinker, the amount per pound of coal is 530 B.t.u. This is converted to high level heat as explained in the first article, as a companion value of low level heat, for a total of $\frac{530 \times 1.4}{1310} = .56$ lb. of lime, or around 10 percent advantage for cement over a lime kiln.

Lime brings heat to the cooler in a similar manner, but the argillaceous material is contributory to lime, and while both bring much more than the above gathered on their way through the hot zone of the kiln, only that gathered in the preheating zone is regenerative and should be taken account of in the equation in some such manner as shown. The remainder of the heat brought to the cooler has been heat of high elevation initially.

The manner and amounts of heat brought into the cooler and its recovery in the very highest degree possible are of extreme importance. There are great efforts made in the improvement of the preheating section of the kiln by various means including ever greater kiln lengths. In this it seems to have been forgotten that the best way to cool the gases in the upper end of the kiln is to cool the clinker effectually in the lower

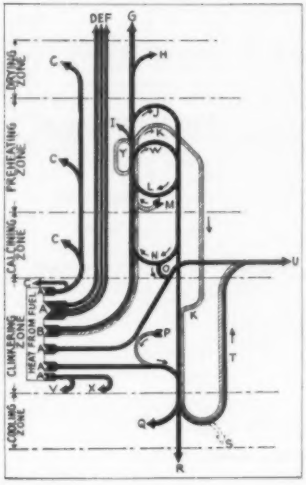



**Fig. 19: Cement kiln heat streams. Letters refer to the following: (A) High level heat streams above 1500 deg. F. (B) Low level heat streams under 1500 deg. F. (C) Radiation loss from all zones of kiln. (D) Sensible heat loss due to excess air. (E) Calcining zone heat loss due to terminal temperature elevation of escaping gases above 1500 deg. F. (F) Sensible heat loss with dust. (G) Sensible heat loss in kiln exhaust, normal products of combustion and $H_2O$ vapor. (H) Loss of latent heat of vaporization of free $H_2O$ in slurry. (I) Loss of latent heat of vaporization of combined $H_2O$ in kaolinite. (J) Preheating of $CaCO_3$. (K) Preheating of argillaceous material. (L) Heat of $CO_2$ from $MgCO_3$ dissociation. (M) Exothermic reaction of kaolinite. (N) Heat of $CO_2$ from $CaCO_3$ dissociation. (O) Heat of calcination differential between 1500 deg. F. and 72 deg. F. (P) Exothermic reaction of formation of cement clinker. (Q) Radiation loss from cooler. (R) Sensible heat loss from non-recuperative cooling. (S) Sensible heat loss if excess air is used and wasted in cooling clinker. (T) Recuperative cooling. (U) Net heat of reaction. (V) Undeveloped heat of CO, $H_2$ and $CH_4$. (W) Preheating of $MgCO_3$. (X) Latent heat of $H_2O$ in fuel. (Y) Heat of preheating combined $H_2O$**

portions of the system, since then, through increase of efficiency, there is less gas to be cooled and more stone to do the cooling.

It is too early to discuss coolers here. Eventually we propose to cover them completely, but we may mention at this time that they are all highly inefficient. On the very face of it no parallel heat flow transfer apparatus can be very efficient; only a counter flow system may be so. An air temperature of 600 to 900 deg. F. is by half too low and very seriously handicaps the rotary cement kiln.

Heat of exothermic reaction, some claim, is developed too late to be of any direct value to the process and can be of some use only if recovered in the cooler. To us it seems it is of utmost value at both points. Still others believe that much heat is necessary to clinker. Relatively high temperature is required but not much heat, not even any heat.

## Heat Generation

The sintering begins gradually in that portion of the material mass brought to this reactive point by the general heat of the kiln. At this point there is some of the exothermic heat evolved in the mass, which tends to raise the temperature of the mass at a rate faster than would have been possible by the mere transfer of heat from the gases. As temperature of the bed rises, the reaction is more rapid and more heat is evolved. We believe that the bed temperature rise is due more to the heat of reaction than to the heat of combustion, and that flame temperature needs to be high, for in addition to initiating the reaction, it acts as a heat seal to counteract a loss of heat from the bed by radiation and conduction. That the temperature of the gas needs to be so much higher than the temperature of the clinkering mass is because the criterion in this case is the temperature of the wall and the clinker loss of heat to the wall when these are in contact.

However, there is more heat developed in the clinkering zone than the wall radiation loss, but there is an additional loss of heat due to residual calcination which extends into the clinkering zone for which the heat of clinkering reaction is used, lowering the clinkering zone temperature and delaying the reaction. This is the terminal zonal overlap which most seriously of all interferes with proper rotary kiln performance. If the material mass could be delivered to the clinkering zone fully calcined, gas temperature needed to maintain radiation loss balance would be far less.

Exothermic heat developed is something very special and advantageous. It is generated through combination of ingredients starting with the eutectic. No air is necessary, there are no products of combustion to carry off the heat and heat is generated in situ with the usual heat transfer delays at a minimum.

If the clinkering mass were not supplying its own heat to build up the temperature, if the heating would have to be from externally flowing gases and hot walls, then efficiency of the rotary cement kiln would be far worse and cement quality would be also.

In the case of lime, there is no such generation of heat within the mass to mention. It all must be transferred into the bed which, due to segregation of stone sizes, takes place in good portion by the very slow process of conduction requiring much time and considerable kiln length for a high degree of calcination. Some 10 percent of the kiln length, of highest kiln temperature and most radiant state, is required to complete the last 5 percent of calcination due to this "conductivity through the mass" requirement, and even then some residual $CaCO_3$ is discharged indicating that heat was unable to penetrate to some portion of the bed cross section which would have been taken care of if there was an exothermal reaction.

The critical point of a cement kiln is not necessarily the preceding lime kiln portion, but its clinkering zone. While this is favored by the exothermic reaction, it is impaired in part due to the inefficiency of the cooler on

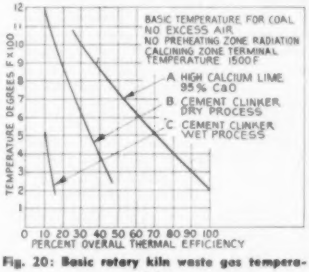



**Fig. 20: Basic rotary kiln waste gas temperature**

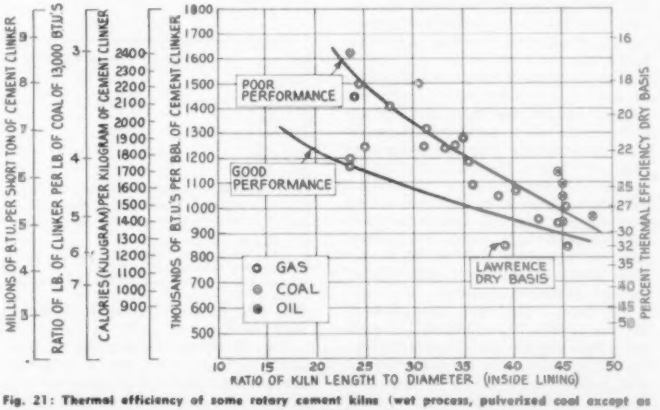



**Fig. 21: Thermal efficiency of some rotary cement kilns (wet process, pulverized coal except as marked)**

one end of this zone and the entrance of residual carbonate at the other end. Due to the relatively low temperature level at which $CaCO_3$ dissociates in respect to required temperature for the melt, and the high heat requirement for its dissociation, even a few percent loss in ignition causes harm, and 12 percent would absorb about all of the heat of exothermic reaction, making the zone entirely dependent on the transfer of heat from the gases.

Then there are the other overlaps between the preheating and calcining and, in the case of wet process, between drying and preheating zones. All greatly hamper the kiln because of the imperfect contact between its gaseous and solid streams, the condition characteristics of the rotary kiln.

It is toward correction of these that the cement man could learn from the lime man since some of the latter have applied themselves toward the study of zonal terminal conditions and deficiencies and by now know much about it. It is surprising, considering how important it all is, that the cement manufacturer has not applied himself more intensively to the study of the kiln in such a thorough, detailed, revealing and inspirational manner as that of Hans Gygi some years ago.

While no one would dispute how the exothermic heat should be applied while calculating thermal efficiency, much discussion could develop over the water of the slurry, with some claiming that it should be counted together with the net heat of reaction. It may if it is so desired, but we do not think it right. We do accept heat of dehydration of clay as useful heat, since it is both essential and unavoidable, but not so for free water, since there are good semi-dry and dry processes. Therefore sensible and latent heat of free water should be listed as waste or charged to the process as a whole, but not credited into kiln efficiency.

This is an important consideration. If we aim to compare one kiln with another, the cement kiln with the rotary lime kiln, or even the wet cement with dry cement process, we must bring them to a dry basis.

Fig. 21 presents thermal efficiency of a group of kilns, all of them wet process except one. Most of them are pulverized coal fired except those indicated. Some are poor as kilns go and some are good. The ratio of kiln diameter to length has a pronounced influence. From them all one stands out prominently, the Lawrence Portland Cement Co., the only dry process kiln shown, using 850,000 B.t.u. per bbl., which is good, but still only 32 percent thermal efficiency.

We realize that such comparisons are not always fair. It is not so much the total length that counts as the dry length. Amount of water in the slurry is a factor. So is the coal ash, radiant characteristics of the fuel and so on, but regardless of what all that may amount to, efficiency still is very poor.

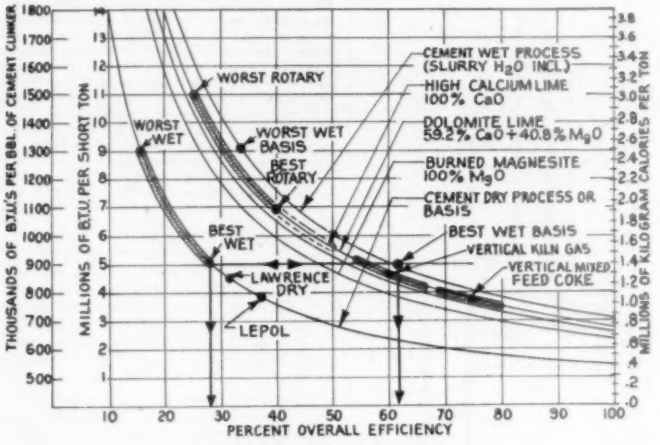



Fig. 22: Overall thermal efficiency

Fig. 22 presents the matter in still another way. There are a series of curves with the lowest representing cement kiln efficiency on dry basis. Thereon the "wet process" range from good to bad is outlined; somewhat better is the Lawrence Portland Cement Co. kiln and still better is the Lepol kiln. No doubt there are poorer performing kilns and also better, but these are all we have on hand that

(Continued on page 191)

**Specific Heat and Molecular Weight**

| | Mol. Wt. | Mean Spec. Ht. |
|---|---|---|
| $CaCO_3$ | 100.09 | .274 at 1648 deg. F. |
| $MgCO_3$ | 84.33 | .300 at 1000 deg. F. |
| CaO | 56.08 | .254 at 2348 deg. F. |
| MgO | 40.32 | .2878 at 2348 deg. F. |
| $SiO_2$ | 60.06 | .270 at 2348 deg. F. |
| $Al_2O_3$ | 101.94 | .276 at 2348 deg. F. |
| $Fe_2O_3$ | 159.70 | .234 at 2348 deg. F. |
| CA | 158.02 | .269 at 2348 deg. F. |
| $C_3A$ | 270.18 | .262 at 2348 deg. F. |
| $C_2S$ | 172.22 | .260 at 2348 deg. F. |
| $C_3S$ | 228.3 | .258 at 2348 deg. F. |
| $C_4AF$ | 485.96 | .260 at 2348 deg. F. |

**Heat of Dissociation**

Per lb. of CaO or $MgCO_3$

| | | |
|---|---|---|
| $CaCO_3 = CaO + CO_2$ at | 1800 deg. F. | at 72 deg. F. |
| | 1315 | 1378 |
| $MgCO_3 = MgO + CO_2$ at | 1000 deg. F. | 72 deg. F. |
| | 1098 | 1170 |

**Heat of Formation Per Pound of Silicate or Aluminate**

| | At 2340 deg. F. | 70 deg. F. |
|---|---|---|
| $2\ CaO \cdot SiO_2 = C_2S$ | 265 | 313 |
| $3\ CaO \cdot SiO_2 = C_3S$ | 200 | 232 |
| $3\ CaO \cdot Al_2O_3 = C_3A$ | 148 | 138 |
| $4\ CaO \cdot Al_2O_3 \cdot Fe_2O_3 = C_4AF$ | | 37 |

**Net heat requirement per lb. silicate or aluminate (heat dissociation minus heat of formation)**

| | Percent Lime | Net Heat of Formation |
|---|---|---|
| $C_2S$ | 65.0 | 582 B.t.u. per lb. |
| $C_3S$ | 73.7 | 784 B.t.u. per lb. |
| $C_3A$ | 62.3 | 719 B.t.u. per lb. |
| $C_4AF$ | 46.2 | 599 B.t.u. per lb. |

**Basic composition of kiln feed and clinker per ton of clinker**

| | Dry Feed | | Wet Feed | | Clinker | |
|---|---|---|---|---|---|---|
| $SiO_2$ | 480 lb. | 15.55 percent | 480 lb. | 10.10 percent | 480 lb. | 24.0 percent |
| $Fe_2O_3$ | 64 | 2.10 | 64 | 1.40 | 64 | 3.2 |
| $Al_2O_3$ | 100 | 3.30 | 100 | 3.00 | 100 | 5.0 |
| *CaO | 1286 | 41.70 | 1286 | 26.90 | | |
| **CaO | 34 | 1.10 | 34 | .70 | 1320 | 66.0 |
| MgO | 36 | 1.17 | 36 | .80 | 36 | 1.8 |
| $CO_2$ | 1049 | 33.95 | 1049 | 22.00 | | |
| ***$H_2O$ | 35 | 1.13 | 35 | .75 | | |
| $H_2O$ (free) | | | 1680 | 35.25 | | |
| | 3084 | 100.00 | 4764 | 100.00 | 2000 | 100.00 |

**Actual clinker composition and net heat requirement/ton clinker**

| | Percent | Net Heat of Chemical Reaction |
|---|---|---|
| MgO | 1.8 | 21.1 |
| $C_2S$ | 47.8 | 374.5 |
| $C_3S$ | 32.8 | 190.8 |
| $C_3A$ | 7.8 | 56.0 |
| $C_4AF$ | 9.7 | 58.1 |
| | 99.9 | 700.6 B.t.u./lb. |

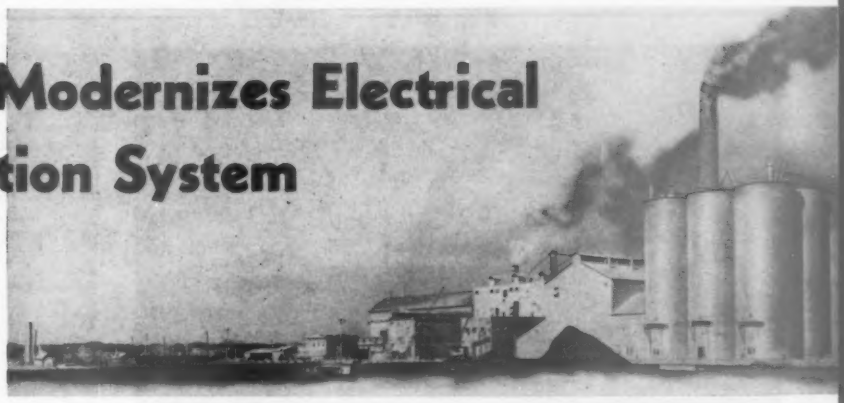
Kaolinite—Kaolin
Total heat required for dehydration 26.-
706 B.t.u./lb. clinker
Exothermic effect 14.-
125 B.t.u. clinker

Net heat requirement/lb. = 718.18 B.t.u.
Net heat requirements with corrections for CaO combined with oxides in feed

Per lb. clinker = 708.8 B.t.u.
Per bbl. clinker = 266,530 B.t.u.
Per ton clinker = 417,714 B.t.u.

*from $CaCO_3$
**combined with oxides
***combined

# Dewey Modernizes Electrical Distribution System



**Power plant enlarged and 375-ft. rotary kiln also added at Dewey, Oklahoma mill**

By CHARLES E. KIETZMAN*

DEWEY PORTLAND CEMENT CO.'s improvement and expansion program, at Dewey, Okla., had its beginning in the late months of 1947. Some has been completed and in operation for quite some time, other projects have been in operation for a few months, while still others are in the process of completion.

The above projects may easily be divided into three separate ones—each involving considerable cost and time for completion, as well as keeping the plant up to date with many of the latest types of equipment.

The first project comprised the revamping, modernizing, and expanding of the power plant and electrical power distribution system throughout the entire plant.

Up to the time of the recent completion of this program, the plant distribution system was supplied from two sources of power: (1) the Public Service Co. of Oklahoma and (2) a steam generating plant operated by the company. This plant consisted of four 1100-hp. boilers and two turbines, one G.E. 3000 kw. and one Allis-Chalmers 3200 kw., generating power at 480 volts. Power purchased up to 1941 or '42 was used only when the cement plant was shut down for annual general repairs, for emergency operations or for peak periods when the company's facilities could not handle all the load requirements, or as we called it, "to keep our plant load and output balanced."

The power sources were not parallel because of inadequate interrupting capacity of switching equipment. Hence, it was therefore necessary to purchase power for one or two complete powerhouse switchboard feeder circuits. This system worked fairly satisfactorily, but of course involved considerable cost, which over a number of years would serve as good interest payments or payments on additional generating equipment.

Since all the waste heat from the kilns was not being utilized, i.e., when the six kilns were in operation, No. 1 kiln gases were exhausted to the atmosphere, and as the generating capacity was the apparent "bottleneck," it was calculated that additional generating capacity could be economically installed (and the possible excess steam which No. 1 kiln was capable of generating) and utilized by a modern steam turbine generator.

A complete study made by the author, W. F. Hildebrand, G. E. sales engineer, and J. M. Glenduining, G. E. switchgear specialist, Dallas office, indicated that when the two existing generators were running, the available short-circuited current would be approximately 103,000 amps. The momentary current that each switchgear equipment must be capable of withstanding was approximately 165,000 amps. The existing oil circuit breakers were entirely inadequate for the interrupting duty to which they might be subjected. The fault conditions would approach twice the above values by the addition of 5000 kw. which was considered necessary to provide for present and future power requirements. Electric power at that time was generated and distributed throughout the plant at 480 volts, 3 phase, 60 cycle.

Further study indicated that a higher generated voltage was absolutely necessary in order to eliminate hazards to personnel and equipment and to facilitate adding generating capacity. It was also imperative to generate at a higher voltage in order to stay within the economic limits of standard switchgear equipment ratings.

The voltage level of 4160 volts was selected instead of 2400 volts, because of the following reasons:

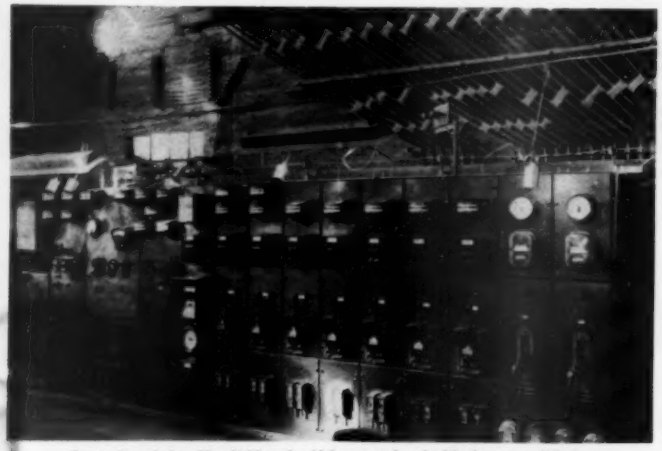
1. Too high short-time fault currents at 2400 volts,
2. Ground fault protection,
3. Savings in primary feeder copper,
4. Cost of rewinding existing generators approximately the same for either voltage.

Nearly all the motor loads in this plant are operated at 440 volts and the load areas are now at distances too great from the generating plant for economic distribution at 480 volts. Therefore, the load center unit substation scheme was selected and the units were located in the load zones. The load center units were selected to afford the following advantages:

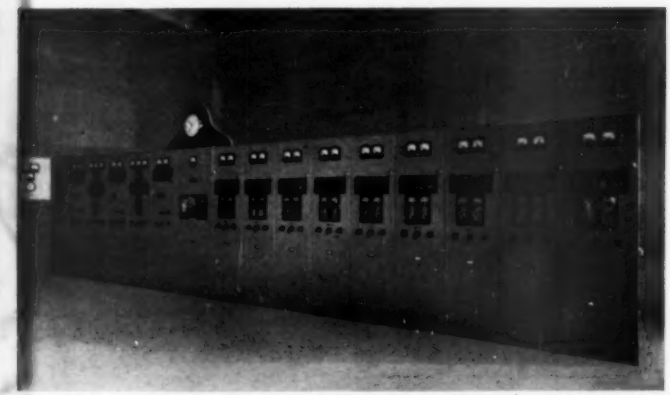
1. Low voltage drop,
2. Low $IR^2$ losses,
3. Permit carrying larger blocks of power to concentrated load areas at a higher voltage,
4. Small cable sizes and the elimination of long heavy copper bus runs,
5. Use of adequate standard switching equipment.

The zone placements of double-ended load center units and two sources of power to each unit insures 24-hr.-a-day service, which is associated with the plant production. The plant layout was divided into seven load areas of approximately the same connected horsepower. Each double-ended load center unit substation is rated 3000 kv.-a., which is greater than the sum of the connected load. However, in the event of trouble in one transformer or fault in its primary feeder line, its associated transformer is capable of carrying approximately the full load in this area for a short time under emergency conditions. All the load centers are the

*Assistant superintendent, Dewey Portland Cement Co., Dewey, Okla.



Front view of the old switchboard, which was replaced with the new switchgear



Switchgear in operation, consisting of one totalizing panel and nine feeder panels of equal capacity

same size and ratings (two 1500 kv.-a. units, etc.,) thus standardizing duplication of primary switches, transformer sections, main and secondary breakers, secondary bus tie breakers and all feeder breakers. It was necessary to split two of the units in order to place it nearer to the center of load area. The secondaries are tied together with proper size cables with normally open tie breakers.

The type of cable used for primary distribution is preassembled aerial Coronal Geoprene with 40 percent copperweld messenger mounted on racks. This type of cable was used because it was more economical than the installation of underground cable due to the large amount of underground piping in the plant. Open overhead lines on insulators were ruled out because of the interruptions caused from accumulation of dust of all kinds on the insulators.

The main power plant switchgear is type MI-6, vertical lift, metal clad, consisting of three generator units, i.e., one old G. E. 3000-kw. generator converted from 480 v. to 4160 v. This necessitated new laminated iron and new stator coils. A new excitor generator was direct-connected to the rotor shaft via a flexible coupling.

On old Allis-Chalmers 3200-kw. generator was converted from 480 volts to 4160 volts. This necessitated a rewind with a new set of stator coils. A new excitor generator was also direct-connected to the rotor shaft via a flexible coupling. Both the above steam turbines were completely overhauled and placed in first class condition.

The new unit is a 5000-kw., 4160-v. G. E. turbine generator which can be and is at the present time synchronized with one of the old units. This 8000 kw. capacity is sufficient for the present demand and boiler capacity.

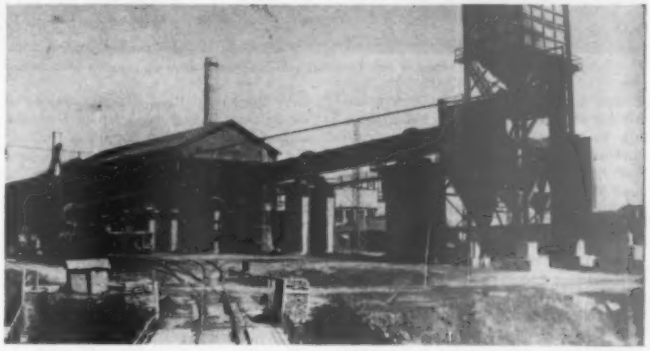
The remaining part of the switchgear consists of one totalizing panel and nine feeder panels of equal capacity and duplicate equipment. Seven

New 5000-kw., 4160-volt turbine generator which is synchronized with older generators. Author is leaning on unit at right

Complete 3000 kv.-a. load center unit; this unit carries the entire packhouse load, boiler load and one compressor

F. E. Tyler (center), chairman of the board of directors, flanked by O. M. Tyler, 1st vice-president and general manager, right, and J. O. Breshear, construction foreman

Looking down on the 200-ft. rock dryer chimney and the cement storage silos



View of new kiln in operation; note 8-in. transport line on towers and support of pipe between towers

of these panels at present carry the seven duplex load centers, one spare panel and one panel to be used for a tie-in for outside source of power. All breakers are rated 5000 volts, 1200 amps, 250,000 kv.-a.

The condenser used in the 5000-kw. turbine is an Ingersoll-Rand twin unit with three I-R pumps for the circulating water and two vertical I-R pumps for the condensate. With this set-up, there is always one standby pump for the circulating water and one pump for the condensate. The condensate water is all pumped back to the boiler and used for feed water, with the exception of that portion used for the plant drinking water.

The spray pond was dug by the plant force with company bulldozers, front end loader, trucks, and LeTourneau scraper. The ditch for both the 24-in. pipe for condenser circulating water to spray and the 4-ft. dia. concrete return line likewise were dug by the company, using an HD-5 Allis-Chalmers bulldozer and a P&H diesel-powered crane with a 2-cu. yd. bucket. Ditches were again closed with the bulldozer.

Crosby Construction Co. of Chicago was the general contractor on this project, with Kelso-Burnett Co., Chicago, and Keener Electric Co., Bartlesville, Okla., sub-contracting the electric installation, and Houston Pipe & Supply Co., Houston, Texas, sub-contracting the installation of the heavy machinery, steam lines, fitting, condenser installing, etc.

During the entire rehabilitation program, the outstanding feature is the fact that the plant operated at full capacity with only a ten day shutdown for general plant repair. This program period covers the time from January 1, 1949 to the present.

Another outstanding feature is that the plant electricians installed all the new 440-volt circuits from the load center units to the various motors without any accident, or interruptions that were noticeable, and with no effect on the average daily production.

The second project consisted of the building of a 250-ft. concrete chimney, with an I.D. of 11 ft. at the top. This was built by Custodis Co., Chicago. Work was started on the chimney in the early spring of 1950 and was completed in the early fall.

This chimney is to serve a two-fold purpose. The high temperature flue running under the first pass of the present four boilers will be connected to the chimney at one elevation (lower opening) and excess gases from the six kilns when not needed for producing steam will be passed into the stack at approximately 1800 deg. F.

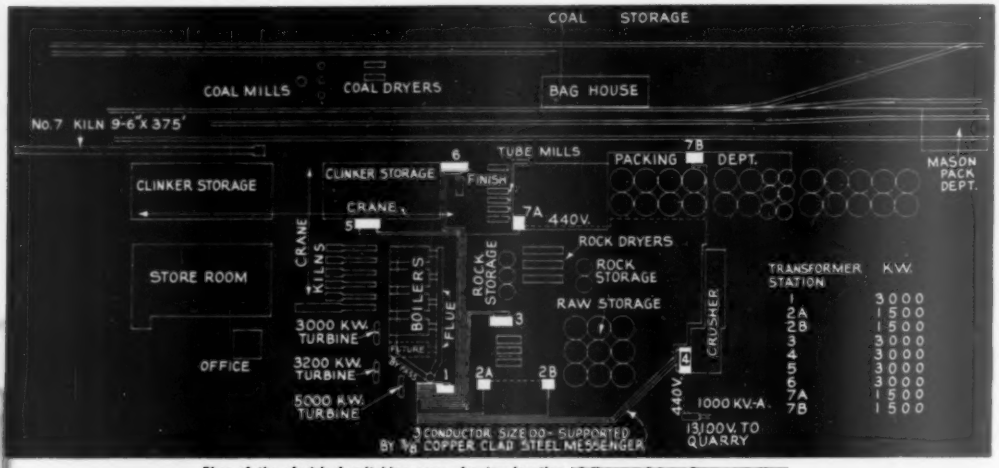
Gases from the present four induced draft fans on the boilers, which are now passing through a low steel stack into the atmosphere, will be passed through a steel flue into the chimney at the second opening about 50 ft. higher than the high temperature flue opening and at about a 90 deg. position from the lower opening. The gas from the fan will be discharged into the steel flue at approximately 450 deg. F.

The high temperature flue will have a vertical damper near the chimney, which will be controlled (opened and lowered) as the boiler steam pressure varies, i.e., open just before the boiler pops off and then closes again at a predetermined point as the pressure drops. Synchronized with this damper operation will be a louvre damper in the low temperature flue near the chimney.

The stack is lined with a wall of fire brick up to the second opening where it is tapered off intermittently to a 9-in. thick wall at the top. An air space opening is between the concrete wall and the brick wall for the entire height of the chimney. An additional 9-in. thick target wall is built up inside of the regular brick wall for approximately 50 ft.

A steel cone hopper is built in the bottom of the stack immediately under the first flue opening, which allows sufficient headroom for a screw conveyor which will periodically transfer any accumulated dust which may drop out of the gases as they passed through the chimney.

The third project covered the purchase of a 9-ft. 6-in. dia. kiln in July, 1950, its installation by the company's construction and electrical depart-




**Plan of the electrical switching gear, showing location of lines and transformer stations**

ments, and placing it in operation during the early part of 1951. This kiln was purchased from Halliburton Portland Cement Co. It was located in East St. Louis and previously had been used for a short period on a government project, and then dismantled when purchased by Halliburton.

The kilns at this St. Louis plant as originally installed consisted of six 9-ft. 6-in. x 250-ft. units. Halliburton transferred three of these complete kilns to Corpus Christi and reassembled them into two kilns 9-ft. 6-in. x 375-ft. long, which now have been operating for a year or so (see ROCK PRODUCTS, August, 1950, page 116). Dewey likewise purchased one complete 250-ft. kiln and a 125-ft. section of another and reassembled these units into one 375-ft. kiln.

Other units purchased, installed, and operating with this kiln consist of the following:

1. Green Fuel Economizer Co. induced draft fan, driven by a G. E. 200-hp. motor through a Texrope unit. The double inlet fan has a capacity of 142,000 c.f.m. at 495 r.p.m.

2. A Buell 16-cone cyclone dust collection system, installed between the fan and kiln.

3. The raw material is fed to the kiln from the raw feed bin by two St. Regis rotary bin feeders, operated by two Master gearmotors, from which power is synchronized with the kiln speed by a generator whose r.p.m. varies directly with the kiln speed.

4. Raw feed is pumped from the blending tank to the kiln feed bin through an 8-in. line with a 10-in. Fuller-Kinyon pump.

5. Clinker is cooled in a Fuller cooler.

6. Pulverized coal is used for fuel for burning. This coal likewise is pumped to the coal storage tank by an 8-in. Fuller-Kinyon pump and fed into the kiln with a Bailey coal feeder driven by a 3 to 5 hp. d-c motor.

Hot air from the cooler is utilized for secondary combustion, while some of this same hot air is pulled from the hood and tempered with atmospheric air, after which it is transferred through a Bayley fan and used for primary air.

The outstanding feature of this kiln installation is that all other departments in the plant had practically sufficient capacity without any additions, so that with only the installation of this one kiln of 90 bbl. per hour capacity, the net output of the plant was increased by 40 percent or more.

The services of F. G. Goodrich, a retired kiln erection engineer with many years of service with Allis-Chalmers Manufacturing Co., were obtained to assist in an advisory capacity with the assembling of this kiln.

### Officers

Two brothers, H. F. and F. E. Tyler, were the founders of Dewey Portland Cement Co. They built the plant in 1906. H. F. Tyler has died, but F. E. Tyler is now chairman of the board of directors. H. F. Tyler's son, D. M. Tyler, is 1st vice-president and general manager. The directors of Dewey Portland Cement Co., in addition to the projects described here, have made many other improvements to the Dewey plant in the last few years.

## Allocation of Defense Orders for Cement Requested

THE CEMENT INDUSTRY ADVISORY COMMITTEE, at a recent meeting with the National Production Authority, requested that an order be issued for the purpose of distributing defense orders equitably among industry members. Some cement producers, particularly those in coastal areas, have reported that their entire production goes into the filling of DO orders. This prevents them from supplying their normal customers who do not carry DO ratings. Though the industry's production is near capacity, demand still exceeds supply, the committee explained. The order recommended by the committee would require cement producers to accept DO's based on approximately 50 percent of their shipments during the first six months of this year. N.P.A. has stated that it will consider the industry's request.

An N.P.A. official told the committee that cement consumption for the first five months of this year was nearly 12,000,000 bbl. more than during the comparable period of 1950. He predicted, however, that due to a shortage of structural steel for construction, the amount of cement consumed for the remainder of 1951 will be slightly reduced.

An order limiting production of certain types of cement to save critical materials was not thought to be necessary at this time, as most producers have already voluntarily reduced production of less essential types. Such an order would, however, be desirable if military and industrial demands increase appreciably, the committee said. Should this occur, it was recommended that the entire committee serve as a task group to study conservation measures.

The committee was informed that multiwall paper shipping bags are expected to continue in short supply, and the industry was urged to keep inventories of these bags at a reasonable level.

# NEW WET PROCESS MILL IN VENEZUELA

## Gas turbines are first in the industry for power generation; plant being expanded

By DR. HENRIQUE THIELEN*

ONE OF THE NEWEST, most modern and efficient cement plants in South America started operation during November, 1949, in Pertigalete, a few miles east of the port of Guanta in the eastern part of Venezuela. This plant is owned and operated by C. A. Venezolana de Cementos, a wholly Venezuelan company which also operates cement plants in Maracaibo and Barquisimeto.

The cement plant is located in a region which during the last decade has undergone a tremendous development of its oil resources. The oil is shipped from Puerto La Cruz and two refineries have just been built for processing the crude oil. An excellent paved road leads from the cement plant to Puerto La Cruz, a distance of approximately five miles. The plant is located less than a mile from the Caribbean sea. The site formerly was an isolated small sugar cane plantation, with practically no communication or other facilities required for a modern industrial installation.

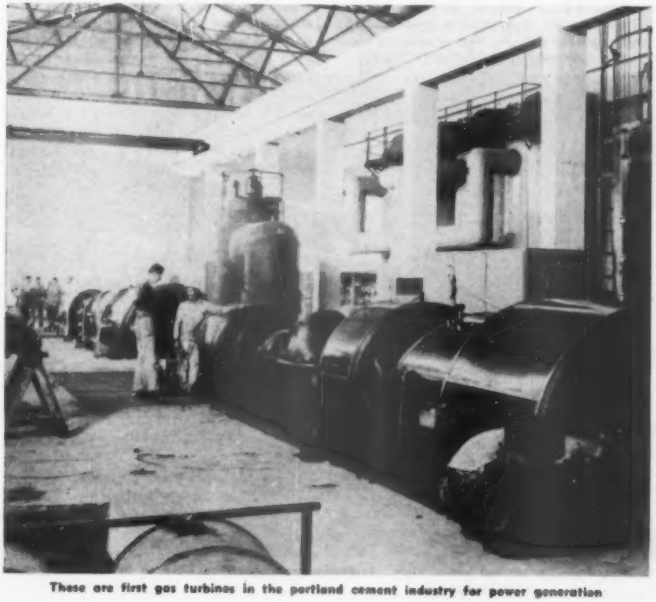
Many problems, therefore, had to be solved involving road building, water supply, construction of a pier for shipment of cement, living quarters for employes, etc. A total of 52 houses was built, along with a club house and a hotel to accommodate guests and a camp for workmen with families, complete with stores, school, medical quarters and recreation facilities.

*General manager, C. A. Venezolana de Cementos, Pertigalete, Venezuela.

### Raw Materials

The limestone deposit is located adjacent to the cement plant. It consists of a mountain of practically inexhaustible quantities of hard, grey limestone of extreme uniformity and high quality, averaging 96 percent calcium carbonate and less than 1 percent magnesium. Three correction materials are used: shale, clay and sandstone, all of which are available within a mile of the plant. The chemical composition of the limestone and correction materials and the choice of four different raw materials permit the manufacture of any desired type of cement, including oil well cement. At present only portland cement Type I is made, for which the raw mix is composed of approximately 77 percent limestone, 13 percent shale, 6 percent sandstone and 4 percent red clay.

The limestone is quarried in open pit. A 2-cu. yd. Lorain diesel-powered shovel loads the blasted rock into Koehring Dumptors of 8 tons capacity, which transport it to the crushing plant a few hundred yards from the quarry. Blasting is also used in the shale deposit, and a ¾-cu. yd. shovel is used for loading the shale and the red clay into a 15 ton capacity Euclid truck which transports the material to the cement plant over a road one mile long. The loose sandstone is quarried in a separate quarry and is also brought in by truck. The three correction materials are fed dry to the raw mill.

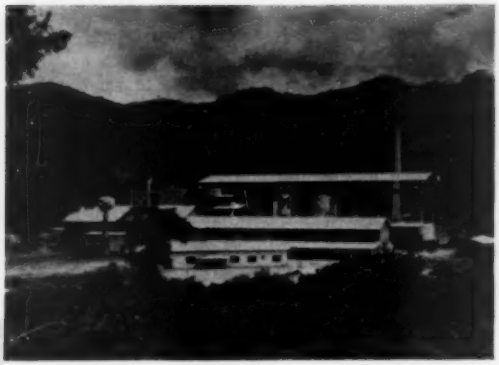


These are first gas turbines in the portland cement industry for power generation

### Cement Plant

The layout of the cement plant, shown on the accompanying diagram, was prepared under the author's supervision and in collaboration with F. L. Smidth & Co., New York, which also furnished the machinery and supervised the erection and initial operation of the cement plant proper. The rated capacity of the plant is 250 metric tons per day (1500 bbl.) using the wet process. Bunker C oil is used as fuel for the kiln. In order to make the plant as simple as possible, machinery of sturdy and tried design was selected so as to obtain an easy operation without impairing the efficiency of the installation.

The crushing plant is designed for an hourly capacity of 100 tons and is of the two-step type. The rock is fed to a Traylor jaw crusher by an inclined laminated apron feeder. The crushed stone passes over a vibrating screen. The minus ¾-in. stone is separated and the oversize passed through a high-speed Dixie hammermill. An inclined belt conveyor, approximately 300 ft. long, carries the crushed limestone either directly to the mill bin or discharges it to the raw material storage by means of a movable tripper. The raw material storage area is served by a 10-ton overhead crane, 80 ft. span, manufactured by Dominion Bridge Co., Canada.



Modern plant of C. A. Venezolana de Cementos is located in eastern Venezuela; kiln is seen on right

Clinker is produced in 325-ft. wet process kiln. A kiln 465 ft. in length will be installed to more than double capacity

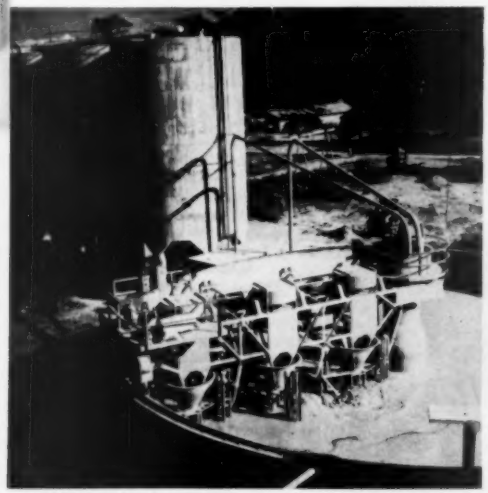
The limestone and the correction materials are removed from the three concrete bins by three Feedoweight measuring feeders and discharged into a Smidth Unidan mill No. 2211 and ground into a slurry with 36-37 percent water and 10 percent residue on a No. 200 sieve. The Unidan mill is a three compartment mill driven through a master gear and pinion by a slow-speed, 167-r.p.m., 700-hp. G.E. synchronous motor. A magnetic clutch reduces the power overload during the start. The mill produces 22-23 metric tons per hour, dry basis.

A Wilfley centrifugal pump transports the ground slurry to three correction and mixing silos. The silos are concrete with conical bottoms and have a slurry capacity of approximately 500 cu.m. each. The agitation and mixing of the slurry in the silos is done by compressed air from a 500 c.f.m. Ingersoll-Rand compressor. The air is distributed evenly to the three silos by means of a Smidth electric air distributor. When the correct composition has been achieved, the slurry is emptied from the silos by gravity and by a centrifugal pump into the storage basin for finished kiln slurry.

The concrete storage basin is 22.5 m. in diameter and 6.5 m. deep and holds approximately 2500 cu. m. of slurry. It is equipped with a Smidth traveling agitator which with a combination of mechanical and air agitation insures a uniform and homogeneous slurry. A centrifugal pump transports the slurry from the basin to the kiln feeder.

The drying, calcining and burning of the clinker takes place in a 9- x 8- x 9-ft. dia. x 325-ft. Smidth Unax kiln equipped with chain system for heat recovery from the waste gases. A 9-tube Unax planetary cooler is mounted on the kiln for cooling of the clinker and for heat recuperation, the cooling air being used in the kiln as secondary air for the oil combustion. The kiln is driven by a 60-hp. G.E. variable speed motor, permitting speed variation of the kiln. The drive mechanism comprises a master gear and pinion coupled to a speed reducer. A stand-by gasoline engine is installed for turning the kiln during any emergencies. The average kiln production is 275 metric tons (1625 bbl.) per 24 hr., with an oil consumption corresponding to approximately 1,050,000 B.t.u./bbl. clinker.

The auxiliary kiln equipment includes a Smidth spiral scoop feeder driven by a motor synchronized with the kiln motor, coordinating the feed to the speed of the kiln. An induced draft fan driven by a 60-hp. motor



Left: Mechanical and air agitation is used for blending slurry in storage basin. Right: Reinforced concrete is featured in mill construction of unique design

draws the exhaust gases through the kiln and the steel dust chamber into a 160 ft. high concrete stack. The oil firing equipment includes filters and preheaters for the oil, screw pumps for injection and atomization of the oil through the burner nozzle at 350 p.s.i. and 235 deg F. An oil-fired boiler (20 hp.) delivers the steam for preheating the oil. A high speed FLS air blower driven by a 20-hp. motor furnishes the primary air for the combustion of the oil. The clinker discharged from the Unax cooler passes a Weightometer for recording the production and is transported by a drag chain conveyor to a clinker pit inside the clinker storage, served by the same overhead traveling crane used for the raw material handling.

The Unax kiln and all the auxiliary equipment are controlled and regulated from an FLS centralized kiln control panel located on the burner platform. On this panel are mounted the start and stop buttons for the various electric motors, recorder for the temperature at the inlet end of the kiln, kiln speed recorder, draft gauges, temperature and pressure gauges for fuel oil, ammeters, feed and overflow lamps, telephone connected with the slurry feeder floor, etc., allowing complete control of the kiln operation and auxiliaries from the burner platform.

The cement mill department consists of a Smidth Unidan mill No. 2288 operating in closed circuit with air separator. The mill bins for clinker and gypsum are of concrete and are filled by the overhead crane. Two Feedoweights remove the clinker and gypsum from the bins, discharging into the Unidan mill. The mill is a three-compartment unit, driven by a 60-hp. G.E. synchronous motor with magnetic clutch coupled to the mill pinion driving the master gear, enclosed in dust-tight casing. The ground material is lifted by an elevator and through a short screw conveyor feed to a 14-ft. dia. Raymond separator, driven by a 60-hp. motor. The tailings are returned to the Unidan mill inlet through a screw conveyor. A Sly filter installation provides the ventilation of the mill and recovers the dust from the mill and auxiliary equipment. The mill produces approximately 14 metric tons (82 bbl.) of standard portland cement per hour, ground to a surface area of 1600 square centimeters per gram. The fine material discharged from the air separator is pneumatically transported through a pipe line to either of the two cement silos by means of a Fluxo pump.

From the two concrete silos, each holding approximately 1000 tons, the cement is drawn pneumatically and conveyed by a screw conveyor and elevator, and passed over a vibrating screen to the feed bin for the cement packer. The packing machine is a

**Living quarters, a hotel, club house, stores, recreation facilities and a medical center were built at plant site**

Bates 4-spout packer, with a capacity of 1000 bags per hr. of 42½ kilograms in standard paper valve bags. The filled bags are carried on two rubber belt conveyors with four discharge stations along the packer ramp for trucks. Provision is made for cement shipment in bulk through two pneumatic pipe lines installed near the bottom of the silos.

## Power Plant

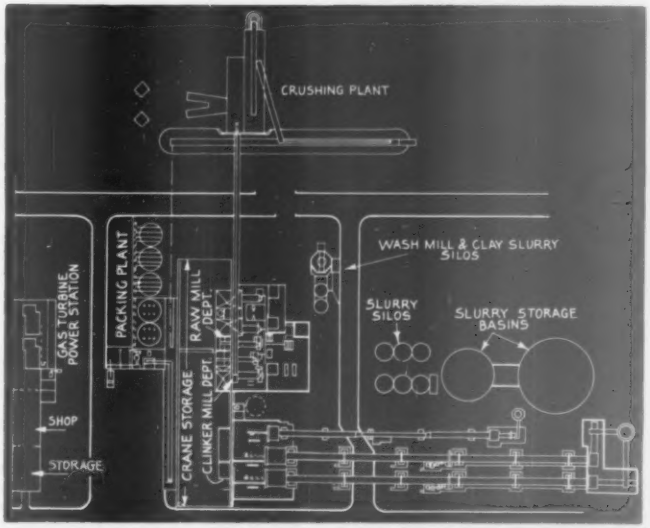
As the cement plant was built in an isolated area with no outside electric power available, the company had to install its own power generating plant. After a careful study it was decided to select the gas turbine principle only recently developed. The Pertigalete plant thus becomes the first cement plant in the world with power generated from gas turbines. The design of the power plant was by Brown Boveri of Switzerland, which also furnished the complete installation and supervised the erection and the initial operation of the power plant.

The main advantages of the gas turbine installation compared to the conventional type of power plant with diesel engines or steam turbines are the lower initial cost and the smaller amount of fresh water required. The efficiency of the gas turbine installation will be further improved when operated with natural gas, which soon will be available in Pertigalete. At present the gas turbines are run on a mixture of Bunker C oil and diesel oil.

The main feature of the installation is the combined compressor and turbine mounted on a common shaft and rotating at 5300 r.p.m. with direct connection through couplings to a gear reducer 5300/1800 r.p.m. and to the generator. Two gas turbine generator units are installed, each developing 1650-kw., 3-phase, 60-cycle, 2400-volt a-c current. One unit is capable of carrying the normal load of the cement plant. The gas is generated in a separate combustion chamber and heat recuperators are installed to improve the efficiency. The combustion air is drawn from outside through large filters. A Brown Boveri switchgear controls the operation of the turbine generators and is equipped with a synchronizing device and distribution controls.

The installation gives an impression of neatness and compactness. The gas turbines have performed perfectly from the very start and the maintenance work is limited to the periodic cleaning of the turbine and compressor rotor. When operated on gas it is expected that the maintenance work will be greatly reduced.

A stand-by Sulzer diesel generator, rated at 400 kw., is used for starting




**Plan of C. A. Venezolana de Cementos wet process plant**

the turbines and furnishes power on Sundays and holidays when the crushing plant and the mills for raw and clinker grinding are not operating.

All electric motors in the cement plant are designed for 400 volts, with the exception of the large mill motors of 700 and 600 hp., which are designed for 2300 volts. The current supplied through transformers to the labor camp and houses is 110 volts.

A modern, well-equipped workshop is located adjacent to the power plant to take care of any reasonable repairs in the cement plant, rolling stock, etc. The plant also has a very well-equipped laboratory with all modern facilities for analysis and production control, testing machines, etc. as well as laboratory mills for grinding tests.

The portland cement produced has been of uniform and high quality from the very start, as shown by the following typical analyses and physical tests made by a laboratory in the United States:

| | |
|---|---|
| $SiO_2$ | 22.69 percent |
| $Al_2O_3$ | 4.65 percent |
| $Fe_2O_3$ | 3.22 percent |
| CaO | 65.21 percent |
| MgO | 1.18 percent |
| Loss on ignition | 1.18 percent |
| $SO_3$ | 1.56 percent |
| **Tensile Strength** | |
| 3 days | 287 p.s.i. |
| 7 days | 382 p.s.i. |
| 28 days | 491 p.s.i. |
| **Compressive Strength** | |
| 3 days | 1664 p.s.i. |
| 7 days | 2970 p.s.i. |
| 28 days | 4470 p.s.i. |
| Surface area | 1610 sq.cm./gm. |
| Autoclave expansion | 0.01 percent |

As mentioned above, the Pertigalete plant now produces only portland cement Type I, but it is the intention to manufacture other types of cement in the future. The portland cement is sold under the name of "Vencemos" and has found a ready market by the oil industry and other consumers in eastern Venezuela. Although the major part of the cement produced is consumed locally and shipped by trucks, either in paper bags or in bulk, a considerable amount is shipped by boat for distribution along the Caribbean coast of Venezuela.

### Plant Extension

In view of the brisk sale of cement immediately following the start of the Pertigalete plant, considerations were given to a large expansion to cope with the present demand and the prospect for future increase of cement consumption in the areas easily reached from Pertigalete. In October, 1950, less than a year after production was initiated, it was decided to proceed with an expansion which eventually will add 600 tons to the plant's present 250 ton daily capacity.

The expansion program is now under way and it is expected that the new kiln will be placed in operation before the end of 1951. The expansion includes one new Smidth 11-ft. 6-in. x 465-ft. kiln equipped with the Unax planetary cooler, and for the raw grinding two Unidan mills No. 2611 driven by two slow speed 1100-hp. G.E. synchronous motors with magnetic clutches. A 738 Allis-Chalmers compartment mill will be installed for cement grinding in closed circuit with a Sturtevant air separator driven by a 100-hp. motor. The mill will be driven by a 1000-hp. motor with magnetic clutch.

Included in the extension program will be a new Smidth washmill for clay, complete with clay slurry feeders; two clay storage silos; a new crushing plant of 350 t.p.h. capacity, consisting of a 48- x 60-in. Allis-Chalmers jaw crusher and a Dixie hammermill with vibrating screen and auxiliary conveying equipment. To increase the slurry storage a Smidth circular storage basin of 5000 cu. m. capacity with mechanical agitation will be installed, as will three additional slurry mixing tanks.

For adding to the capacity of the packing plant there will be installed a Smidth Fluxo rotary packer with a capacity of about 2000 bags per hr. The bagged cement can be transported by belt conveyors either for loading into trucks or for transporting to the pier 1000 yd. away. This pier will be extended to receive ocean-going vessels for loading cement in bags or in bulk for distribution along the Caribbean coast.

To take care of the added power requirements, the power plant will be increased with a new Brown Boveri 5000-kw. gas-turbine generator.

The entire expansion of the cement and power plants is expected to be completed during 1952. The plant will then have a daily capacity of 850 tons of cement (about 5000 bbl.) and will be among the largest and most modern cement plants operating on the South American continent.

Immediately prior to the writing of this article, Venezolana ordered a new 600-ton Smidth Unax kiln identical to the above 11-ft. 6-in. x 465-ft. kiln equipped with planetary Unax cooler, so that by the end of 1952, the kiln capacity of the Pertigalete plant will be 1400 to 1500 t.p.d.

The grinding capacity of the above mentioned mills will, more or less, correspond to this large kiln capacity, as new deposits of very soft limestone have recently been discovered.

Besides the Pertigalete plant, C. A. Venezolana de Cementos owns and operates a cement plant in Maracaibo with 3000 bbl. daily capacity and a smaller cement plant at Barquisimeto.

Senor don Eugenio Mendoza is president of C. A. Venezolana de Cementos and Dr. Henrique Thielen is general manager. Manager of the Pertigalete plant is Dr. Henrique Stolk and Sr. J. R. Silva is chief chemist.

## Canadian Cement Plant

CANADA CEMENT CO., LTD., Montreal, Canada, which is now building a cement plant near Havelock, New Brunswick, has arranged a fixed tax with the Westmorland County Council. The agreement calls for an annual fixed tax of $16,000, with provisions for an additional two cents per barrel on the cement that is produced at the new plant. This was reported as one of the most favorable tax agreements for new industries in Canada in years.

The cost of the new plant has been estimated at about $5,000,000 and is expected to be in operation this summer. Plant capacity will be about 800,000 bbl. of cement annually. A large supply of limestone is available on the plant site and nearby are large deposits of gypsum and shale. At the beginning of operations about 125 men will be employed and, at peak production periods, about 300.

## Testing Asphalt Deterioration

ATLANTIC REFINING CO., Philadelphia, Penn., recently announced that experiments conducted at its laboratories, by Dr. John H. Ramser and Dr. F. C. Gzemski, have proved that radioactivity can be used successfully to forecast the extent of deterioration of asphalt roads due to the action of water. Experiments showed that ordinary calcium chloride, a minute portion of which has been made radioactive, can be successfully employed for the accurate measurement of the amount of stone surface exposed during the deterioration process.

For the test, an extremely small amount of radioactive calcium chloride, which emits only a soft beta ray, is deposited on the surface of a test sample of the stone, prior to coating with asphalt. The asphalt-coated stone is then subjected to the action of water. As deterioration takes place, a fraction of the stone surface may be uncovered, and when this occurs, the radioactive calcium chloride covering the exposed part of the surface will dissolve in the water. The radioactivity of the water solution is then measured with a Geiger counter.

This laboratory test, according to the company, indicates the permanence of the bond between the asphalt and the stone. By using this information, the asphalt manufacturer can blend asphalts and additives to create a superior paving material.

# Mostly Routine Business Conducted by N.C.S.A. Directors

THE MIDSUMMER MEETING of the board of directors of National Crushed Stone Association at Hot Springs, Va., July 19, 1951, was not distinguished by any unusual circumstances. Apparently it did settle the status of Otho M. Graves as a director and member of the executive committee. Mr. Graves resigned as a director at the Cincinnati convention last January because of complications in connection with the representation of his company on the board of directors.

The board in effect refused to accept his resignation, and he remains a member of both the board and of the executive committee by virtue of being a past-president of the Association. All past-presidents are life members of the board. Mr. Graves is and has been also a director at large through election by the board, which is empowered by the association's constitution to elect two directors at large, the other members of the board being elected by letter ballot of the entire membership.

A large part of the time of the midsummer meeting of the board of directors was devoted to rewriting the by-laws to govern details in the election of officers and directors, but when it came time to elect one or more directors at large, there was considerable difference of opinion regarding interpretation of the new by-laws. The argument was finally settled by the chairman's ruling that the proposal to nominate directors at the midsummer meeting was out of order, because the newly rewritten by-laws apparently made election legal only by the "new board of directors," meeting at the time of the annual conventions.

## Engineering and Research

A. T. Goldbeck, engineering director, made a brief report of progress in research. During the past year many honors have come to Mr. Goldbeck in recognition of his years of service to the various engineering and research organizations with which he is associated. He now is first vice-president of the American Concrete Institute, which means he will be president in 1952. In January, 1951, he was given a Distinguished Service Award by the Highway Research Board for "distinguished service in highway research." There were only two recipients. In June, he was made an honorary member of the American Society for Testing Materials after some 31 years of affiliation. Only five of the 6761 members received this honor.

Aside from continuation of research projects of the kind mentioned many times before, perhaps the most interesting new laboratory study has to do with the incorporation of water-repellent mixtures in concrete. Mr. Goldbeck, along with a few other researchers in concrete, has come to recognize that the water retained in the very smallest pores and capillaries of concrete may be responsible for much of its lack of durability. He said his preliminary tests "show promise." Incidentally, Mr. Goldbeck expressed his appreciation of articles in ROCK PRODUCTS which are helping to direct research on cement and concrete along such new lines as this.

## Field Engineer's Report

J. E. Gray, field engineer, reporting on details of his job, emphasized the handling of the individual problems of various members, and the opportunities provided better to know members and the problems of the industry as a whole.

Many of his problems have to do with concrete and the difficulty of crushed stone producers in supplying an aggregate which will meet water-cement ratio specifications, with a fixed amount of cement, because of the lack of placeability or plasticity of concrete made with angular fragments rather than rounded ones. This problem can be solved by a method of concrete mix design developed by Messrs. Goldbeck and Gray, but not so generally adopted as to eliminate much individual educational work.

In the East, at least, there appears to be a definite trend away from portland cement concrete for heavy traffic pavement construction to deep base asphaltic types. For example, the recently-let contract for the New Jersey turnpike calls for about 20 in. of crushed stone base and an asphaltic concrete surface. A trend of this kind can mean big business for crushed stone producers at the expense of cement and sand-gravel aggregate producers. Keeping this in mind, one can understand why, in his report, Mr. Gray said:

"It is my opinion that probably the most important problem facing the crushed stone industry is the proper construction of crushed stone base courses. While, in many areas, a very fine job is being done, in other areas unsatisfactory bases are being constructed for one reason or another. A short review of the history of the flexible pavement may throw some light on the problem. Water-bound macadam is probably the oldest and best of the flexible bases used on our primary roads. However, with the advent and continued use of portland cement concrete for pavements, many states adopted a policy of using concrete for the primary system of roads. The result was that the flexible pavement was not designed for a given wheel load, but was built to be adequate for the traffic at the lowest possible cost. Low quality materials were used and low cost construction methods employed. While it is true that many miles of fine roads have been built at low cost which are adequate for the traffic, it does not mean that the same materials and construction methods can be used for a heavy-duty road on the primary system."

In short, as we see it, more attention will be paid in the future to the design of asphaltic macadam-type pavements, adapted specifically to carry the same kind and density of traffic, that hitherto has been more or less a monopoly of portland cement concrete pavement.

## National Developments

The report of the administrative director, J. R. Boyd, dealt chiefly with the effect of the Defense Mobilization Program on the crushed stone industry. The outlook for construction is somewhat confused, as can be judged from the following quotation from Mr. Boyd's remarks:

"Customarily, at this time of year, it is possible to make a reasonably accurate prediction as to the volume of construction activity to be anticipated for the year, but because of tightening controls imposed under Order M-4 upon all types of construction, it is not possible to indicate accurately the volume of construction which may be expected for this year. As far as our industry goes, information which comes to us indicates a high level of activity for the first six months, but the degree to which curtailment may be expected during the second half of the year is largely dependent upon the extent to which controls will limit construction.

"In the highway field, the Defense Production Administration has designated the Bureau of Public Roads as claimant agent for highway construction and maintenance, which gives to the Bureau authority to receive and approve applications requiring approval for highway, road and street projects. With practically every new public or private construction project requiring NPA authorization, serious delays seem unavoidable in securing approval even for urgent projects, because of inadequate administrative machinery necessary to process applications properly.

"Of specific interest to crushed stone producers is the fact that the order does exempt additions, improvements, or modernizations for industrial facilities which require less than 25 tons of steel."

## Committee Reports

P. E. Heim, president of the Agricultural Limestone Institute, reported progress on the proposed amalgamation of the institute with the National

(Continued on page 182)

Loading rock in the quarry with a 2½-cu. yd. shovel

A diesel-powered tractor is used to spot railroad cars

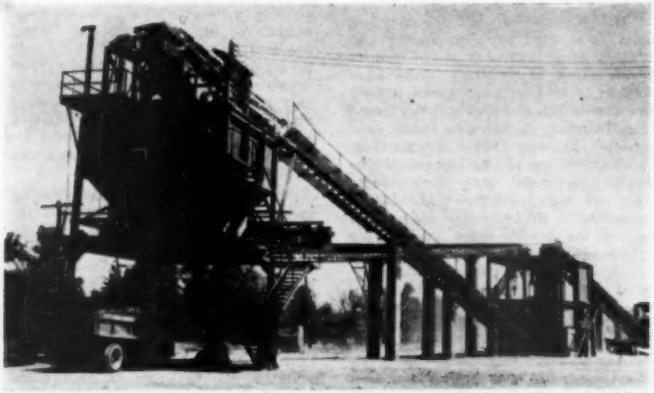
# MECHANICAL HANDLING OF RIPRAP

Another view of loading riprap into railroad cars; the chute in center is a little narrower than the gondola

**Big Rock Stone and Material Co. has plant at Little Rock, Ark. which handles large size riprap over vibrating scalper, loading directly to railroad cars**

MECHANICAL HANDLING AND screening of riprap where a sized stone is specified presents many problems, most of which occur from the wear and tear on equipment from the loading shovel to the bottom of the gondola that hauls the rock away. Near Little Rock, Ark., the Big Rock Stone & Material Co. has worked out a system that seems to be one solution.

Big Rock Stone & Material Co. was acquired by Minnesota Mining & Manufacturing Co. during the past year. Three M has one of the largest and finest granules plants in the world near the capitol city of Arkansas. Big Rock is now headed by W. E. Vroman, vice-president and general manager and the aggregate and ready-mixed concrete business is carried on under the old company name of Big Rock Stone & Material Co.



View of plant that handles the minus 8-in. stone; 4¼-ft. cone crusher is at right, and at left is the 5- x 12-ft. single-deck screen over storage bins

### Quarries

The aggregate producing company has two quarries, one near North Little Rock and one known as the Arch Street quarry on Highway 167 some five miles south of Little Rock. Minnesota Mining & Manufacturing Co. still has a quarry near the granules plant.

At the Arch Street quarry the old company prior to its transfer to its present owners did some preliminary work towards building a new crushed stone plant. The general plan was to have the primary and secondary crushing section on one side of Highway 167, and the screening plant on the other. A belt conveyor system with a high overhead cross-over along with a reclaiming tunnel from a surge pile was included in most of the earlier work. The newer riprap operation was more or less tied onto the head end of the conveyor system, and a simple screening plant tied onto the tail end. The latter is owned and operated by Big Rock and is a temporary plant pending a possible building of a much larger and more modern crushing and screening plant.

### Riprap Screening

At the Arch Street set-up riprap from 50 to 3000 lb. in weight is being processed; all minus 8-in. rock goes to the crushing plant for commercial aggregate and the overaize is shipped as riprap.

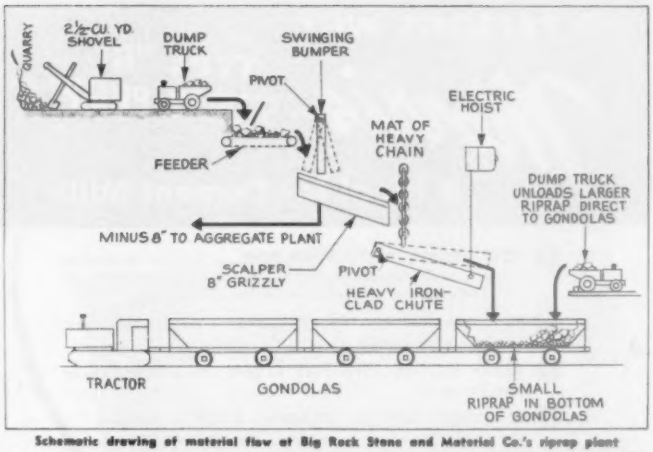
Referring to the flow diagram it will be seen that the method of screening the riprap is very simple but still has some novel features that should make this information worthwhile. The rock is a hard syenite which is loaded to a fleet of Koehring Dumptors by a 2½-cu. yd. Lorain shovel. The shovel is provided with an Amsco bucket. Some selectivity in loading is practiced so that part of the larger stone does not have to go to the screening plant but is loaded direct from a ramp built parallel to the rail line. If the load contains any stone in the minus 8-in. range, that load goes to a truck hopper under which is a heavy-duty Pioneer apron feeder. However, a large percentage of the stone must go to the Pioneer feeder and much stone of the maximum size is in those loads.

A Robins scalping grizzly has been installed following the apron feeder; this is a standard vibrating mechanism. A heavy swinging bumper has been installed above the scalper to absorb some of the impact when the 3000-lb. stone falls to the high end of the scalper. The oversize from the scalper next falls (and at the same time has a 90 deg. change in direction) to an iron-clad chute or loading apron that is about the same width as the gondola car. The low end of this heavily-constructed loading lip can be raised or lowered by a Robbins & Meyers electric hoist. Thus switching can be carried on under the assembly by raising the lip, and when loading is in progress it is lowered to such an angle that the stone will flow with least impact into the car.

Suspended above the loading lip are six strands of heavy steel chain to which have been fastened short lengths of steel rails to give added weight to this mat, the primary purpose of which is to absorb some of the shock as the rock leaves the Robins scalper and hits the loading apron. Attempts are made to spread a layer of this type of riprap over the bottom of the gondola but not to fill it completely. When the car is about half loaded the string of gondolas is pushed downgrade by a Caterpillar "35." The move here is about a car length, which puts the partly loaded car in position to be completely filled by the Koehring Dumptors (hauling the larger sizes of rock that are free of fines) directly on top of the material loaded from the screening plant.

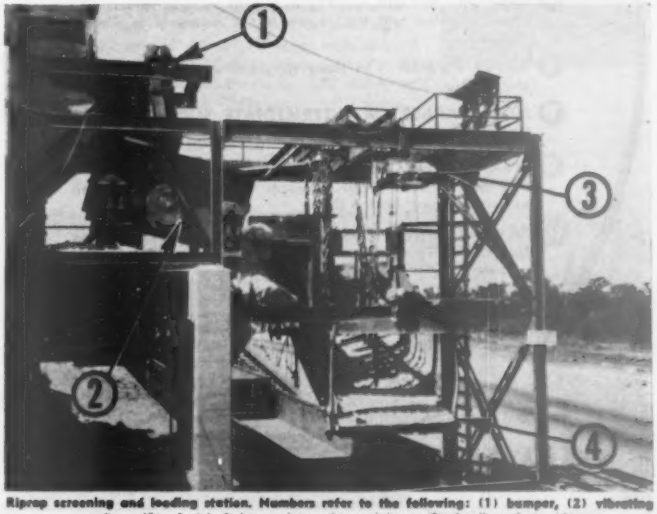
At the time of inspection the Robins scalper had handled about 100,000 tons of rock without damage to the vibrating mechanisms and about the only repairs necessary were on grizzly bars and other heavy wearing parts. The heavy-duty Pioneer feeder has stood up in an excellent manner. It is driven through a Philadelphia reduction gear.

(Continued on page 176)




Schematic drawing of material flow at Big Rock Stone and Material Co.'s riprap plant

Minus 8-in. rock is conveyed across highway to the surge pile at the left, from which it is carried to the crusher




Riprap screening and loading station. Numbers refer to the following: (1) bumper, (2) vibrating scalper, (3) electric hoist used to raise and lower the loading chute (4)

The throughs from the scalper fall to a hopper and a cross belt carries the rock under the gondola switching track. This short belt serves another hopper under which is a heavy-duty Jeffrey electric vibrating feeder. The feeder serves a 30-in. Hewitt-Robins shock pad inclined belt conveyor that elevates the rock to a transfer station where a cross-over belt over Highway 167 carries the material to a surge pile. Under the surge pile is a second heavy-duty Jeffrey feeder which serves the belt to the crushing plant. The idlers on the installation are Link-Belt.

The crushing plant is quite simple, as a minus 1¼-in. material is about the only product made. A 4¼-ft. Symons cone operates in closed circuit with a 5- x 12-ft. single-deck, dry, Allis-Chalmers Ripl-Flo vibrating screen. The vibrating screen is mounted over a two-compartment steel bin so a second size can be processed if desired. Over the cone crusher is a heavy I-beam from which is suspended a pair of 5-ton capacity Yale and Towne chain blocks to facilitate repairs. Punched plate is used on the deck of the Ripl-Flo. A 1½-in. spaced rail grizzly is ahead of the cone crusher so fines by-pass it.

Large riprap is dumped directly from truck into railroad cars

The quarry has been opened up in three places, but at the time of inspection the only active face was that nearest the riprap loading section, making a haul of about 150 ft. on a flat grade. The face is about 70 ft. high. Two churn drills do the primary drilling. Ingersoll-Rand Carset tungsten carbide bits are used and Hercules Gelamite No. 2, and No. D is loaded in broken decks in each hole. For secondary breaking a 5000- and a 6000-lb. drop ball are available, both handled by a Northwest crane.

## Opens Division Office

LONE STAR CEMENT CORP., New York, N. Y., recently opened a new division office in Richmond, Va. The office will serve as sales and service headquarters for both the Norfolk and Lone Star, Va., plants. Dwight Morgan, vice-president, C. W. Marshall, sales manager, and E. A. Griffin, assistant treasurer, of the Virginia Division, now have headquarters at Richmond.

# Steel

## *Vulnerable* to Socialistic Rust!

Urged on and on by the incentives afforded by our free enterprise system—Americans, with the private money of thousands of stock holders, have built a Bulwark of Steel greater than all the rest of the world.

The capacity of America's steel industry is so great that in 24 hours, it can turn out ingots and castings sufficient to provide finished steel for—500 airplanes, 500 tanks, 1,000 anti-aircraft guns, a half million 3-inch shells, 1,000 howitzers, 2,000 aerial bombs, 1 aircraft carrier, 2 heavy cruisers, two cargo ships, two tankers, 1,000 freight cars, 2,000 trucks, 12,000 automobiles, 20,000 refrigerators, 20,000 stoves, 2,000 homes, and still have 23,000 tons of steel for other purposes.

Remove the incentives of free enterprise or burden it with excessive restrictions and our magnificent steel industry will be vulnerable to the wasting erosion of socialistic rust.

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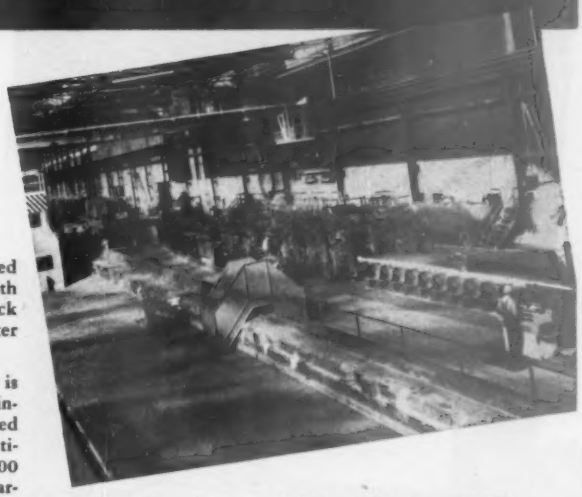
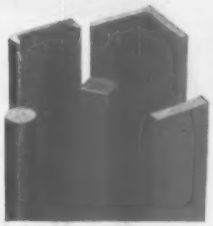
HOUSTON KANSAS CITY TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION



## *Most Modern of Merchant Mills*

On this highly mechanized 12-inch merchant mill, steel billets are more efficiently rolled into a wide variety of merchant shapes and sizes vital to manufacturing.

It is a typical example of the continuing modernization and expansion program of Sheffield Steel which, in the last ten years alone, has more than tripled the at-home steel making capacity of Sheffield Steel mills. New furnace and blooming mill capacity now under construction will enable Sheffield Steel to continue to pace industrial progress with an ever increasing supply of steel—the vitamin A of industrial growth.



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There are few industries that do not use merchant steel. Sheffield Steel mills roll a wide variety of bars and shapes.

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***Export Representative:*** ARMCO INTERNATIONAL CORPORATION • Middletown, Ohio

MORE SCRAP MEANS MORE STEEL • TURN YOURS IN TODAY!

## Durability of Concrete

*(Continued from page 157)*

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(24) Davis, Brown and Kelley, "Bond Between Concrete and Reinforcing Steel," Pro. A.S.T.M., p. 405 (1938).

(25) Harold S. Sweet, "Research on Concrete Durability as Affected by Coarse Aggregate," Pro. A.S.T.M., Vol. 46, p. 988.

(26) T. C. Powers and T. L. Brownyard, "Physical Properties of Hardened Portland Cement Paste," A.C.I. *Journal*, January, 1947, p. 583.

(27) C. H. Scholer, "A Wetting-and-Drying Test for Predicting Cement Aggregate Reaction," Pro. A.S.T.M., Vol. 49, p. 942.

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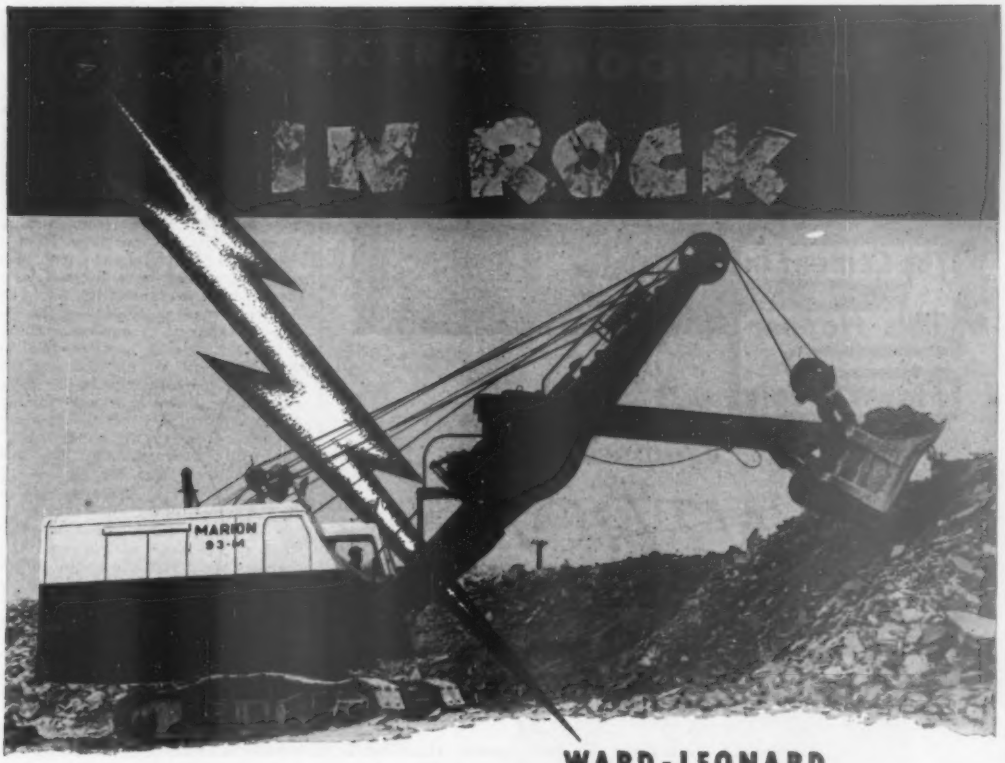
## Calcium Chloride Pamphlet

CALCIUM CHLORIDE ASSOCIATION recently announced the publication of Brief SB-2, "Calcium Chloride for Unpaved Roads," which describes proper procedures for using calcium chloride on aggregate-surfaced roads for the purpose of reducing dust and conserving materials, plus giving advantages of lower maintenance costs and all-weather surfaces.

Free copies of the brief may be obtained by writing to Calcium Chloride Association, 909 Ring Bldg., Washington 6, D. C. Duplicate glossy photos used in the brief are also available on request.




WARD-LEONARD

# MARION 93-M ELECTRIC

The new MARION 93-M Ward-Leonard Electric shovel digs rock with smoothness you'd never expect from a 2½-3 cu. yd. machine.

There's no jerking—no hesitating—no "stuttering" when the dipper comes up through a rock pile. There is power to spare, applied so smoothly that there is no machine strain or breakage.

This is the kind of smoothness that pays off in longer machine life, greater daily yardage and greater dependability.

From its long, wide, steady crawlers to the big, reversible dipper teeth, here is a MARION designed and built for service in rock digging.

The 93-M is built to MARION standards of quality that mean year-after-year dependability and true, long-range economy. It is backed by 66 years of shovel design and manufacturing experience.

*Call your nearest MARION representative, or write to the factory.*

## Maintenance Reduced

*(Continued from page 160)*

or a total of 36 hr. for complete disassembly, repair, and assembly. Multiply the time saved by the current wage rate, and there is a saving of $72 on the job. The tool has more than paid for itself in repairing just two of these mills.

According to the repair foreman, the air Impactools run from morning to night. The men get them from a central tool room and return them there when they have finished with them. In the beginning, the men felt that they could do the job in the ordinary way with a hand wrench in no more time than it would take to do the job with the air tool, plus the time of two round trips to the store room. They found they were wrong. "It took a while to get the men accustomed to using the power tools," the repair foreman said. But now they are in constant use.

Benefits accruing from the use of air Impactools in the plant are reduction of worker fatigue, and improvement of the work. Repair men say they can work with the air Impactool for hours at a time without getting tired. This is because the tool automatically "impacts" whenever the spindle meets resistance, as, for example, on a frozen nut. Then thousands of rotary impacts per minute are delivered to the work to overcome the resistance.

Although the torque action is automatically put on the work, none of it is transmitted back to the worker. There is no kick-back or twist of any kind to the operator's hand. All the "extra" power is concentrated on the work, without any exertion from the operator, and without any torque reaction returning to the operator. It is this feature which eliminates fatigue.

It's surprising that the Impactools, used every day, are not themselves set aside for repair and service. Yet the foreman reports that in the two years the plant has been using air tools, they have never needed maintenance, other than routine lubrication.

By substituting power tools for hand work the company feels that it accomplishes these objectives: (1) faster repair, with significant savings in time and money; (2) elimination of operator fatigue; (3) increase in operator morale, and (4) improvement in the work.

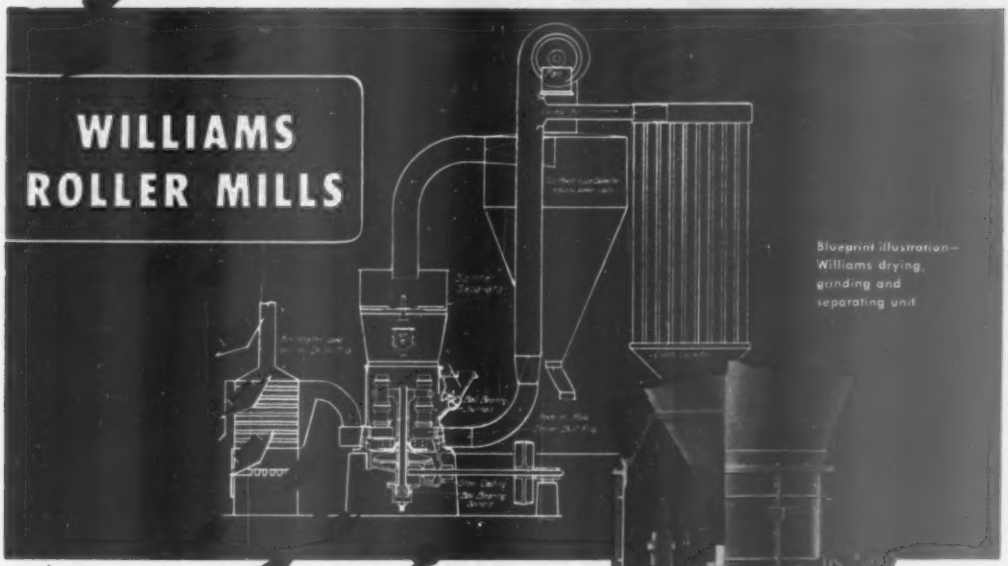
## Labor Relations Trends

*(Continued from page 95)*

Act and the Board's application of it in doubtful situations are entitled to weight. In the views of the Board as applied to this case we find conformity with dual congressional objectives of preserving the right of labor organizations to bring pressure to bear

# For those Fine Grinding Jobs . . .

## WILLIAMS ROLLER MILLS



Blueprint illustration—Williams drying, grinding and separating unit

## *let's look at the record*

**LIMESTONE**

Many Williams Roller Mills are satisfactorily grinding limestone to 99% 325 mesh or 85% 200 mesh and for all other commercial uses finer than 40 mesh.

**LIME**

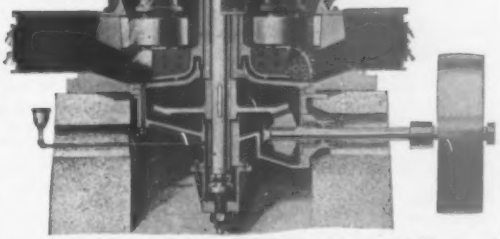
Both burned and hydrated lime can be satisfactorily processed in Williams Roller or Impact Mills. Automatic throw-out rejects impurities and unburned cores. Dustless operation.

**CLAYS, TALC, KAOLIN**

Can be reduced to any fineness from 40 mesh to micron sizes. Impurities removed by automatic throw-out.

**DRY AND GRIND SIMULTANEOUSLY**

Simply by introducing hot air, all sizes dry as they grind eliminating the need of separate drying equipment.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

***WILLIAMS ALSO MAKES . . .***

**Heavy-duty hammermills for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.**

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# WILLIAMS

CRUSHERS GRINDERS SHREDDERS

on offending employers in primary labor disputes and of shielding unoffending employers and others from pressures in controversies not their own.

"For these reasons we conclude that the conduct of the respondents [Denver Building and Construction Trades Council] constituted an unfair labor practice within the meaning of Section 8(b)(4)(A). The judgment of the Court of Appeals accordingly is reversed and the case remanded to it for procedure not inconsistent with this opinion. It is so ordered."

Three justices dissented. Mr. Justice Jackson would affirm the decision of the Court of Appeals. Mr. Justice Douglas and Mr. Justice Reed said in part: "The picketing would undoubtedly have been legal if there had been no subcontractor involved—if the general contractor had put non-union men on the job. The presence of a subcontractor does not alter one whit the realities of the situation; the protest of the union is precisely the same. In each, the union was trying to protect the job on which union men were employed. If that is forbidden, the Taft-Hartley Act makes the right to strike, guaranteed by Section 13, dependent on fortuitous arrangements that have no significance so far as the evils of the secondary boycott are concerned. I [we] would give scope to both Sections 8(b)(4) and 13 by reading the restrictions of Section 8(b)(4) to reach the case where an industrial dispute spreads from the job to another front."

For the benefit of those who have forgotten the exact wording of Section 8(b)(4) and (A) of the Taft-Hartley Act it reads as follows:

1 "Sec. 8. * * *
"(b) It shall be an unfair labor practice for a labor organization or its agents—
* * *
"(4) to engage in, or to induce or encourage the employes of any employer to engage in, a strike or a concerted refusal in the course of their employment to use, manufacture, process, transport, or otherwise handle or work on any goods, articles, materials, or commodities or to perform any services, where an object thereof is: (A) forcing or requiring any employer or self-employed person to join any labor or employer organization or any employer or other person to cease using, selling, handling, transporting, or otherwise dealing in the products of any other producer, processor, or manufacturer, or to cease doing business with any other person; * * *." 61 Stat. 140-141, 29 U.S.C. (Supp. III) 158 (b)(4)(A).

Section 8(c) of the Act designed to meet the "freedom of speech" defense, of both labor and management reads as follows:

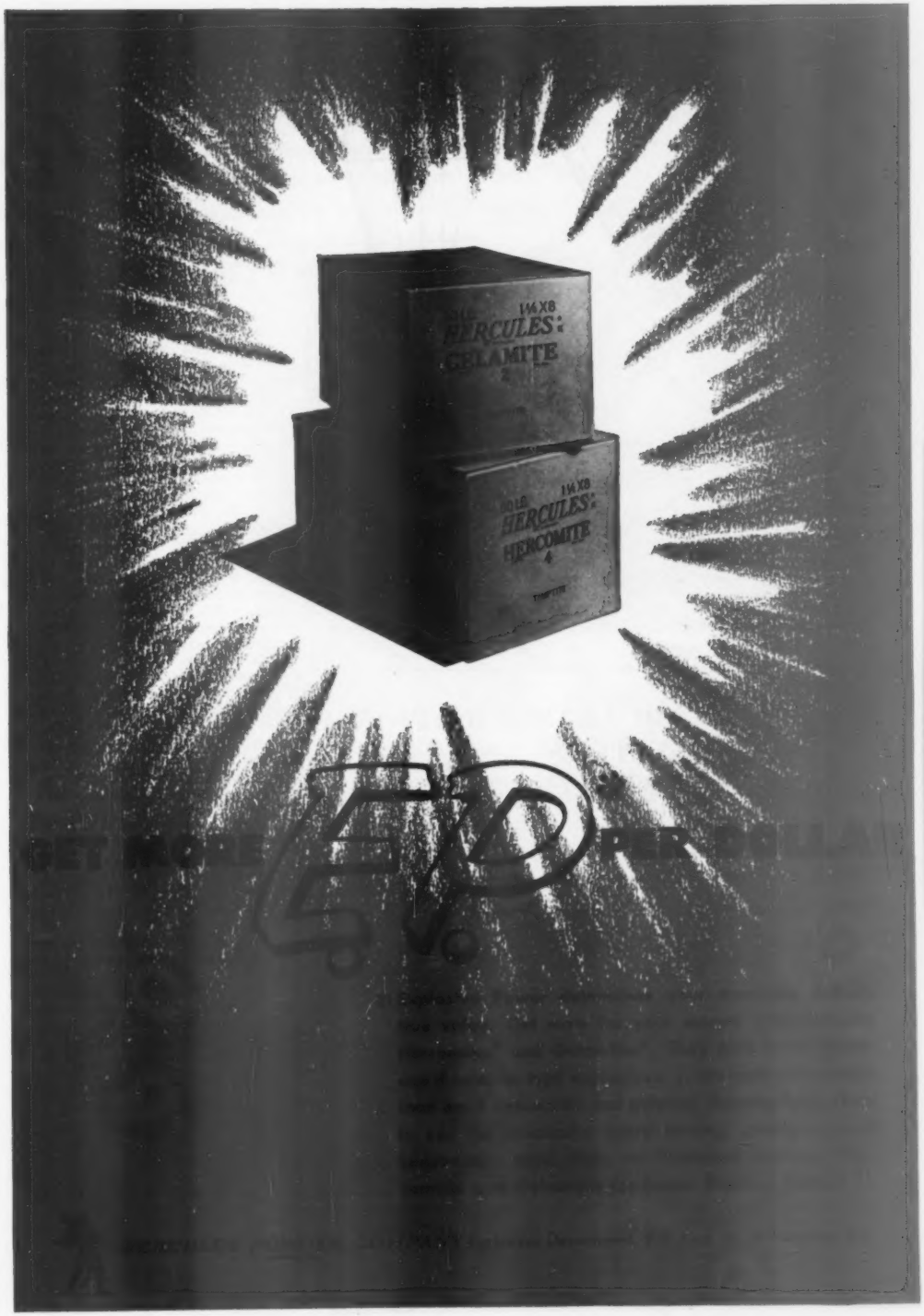
"The expressing of any views, argument, or opinion, or the dissemination thereof, whether in written, printed, graphic, or visual form, shall not constitute or be evidence of an unfair labor practice under any of the provisions of this Act, if such expression contains no threat of reprisal or force or promise of benefit."

## N.C.S.A. Directors Meet

*(Continued from page 173)*

Agricultural Limestone Association. The suggested merger is temporarily in suspense pending a definition of what "affiliation" with the National Crushed Stone Association may mean to each group. A committee of ten from each association will confer soon on details.

J. Craig McLanahan, chairman of


1¼X8
HERCULES
GELAMITE
2
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HERCULES
HERCOMITE
4

the Manufacturers Division, reported progress on the 1952 convention exhibit at the Stevens Hotel in Chicago, and said that he thought some of the exhibit "bugs" of the previous show in Chicago had been ironed out. There followed a discussion as to the kind and size of future shows, with the practically unanimous opinion that it would be better for all concerned to keep them of such size and character that they could be held in the hotel, adjacent to the meeting rooms if possible, and not to hold exhibits of full scale size at some outside hall or auditorium, as has been suggested for the exhibits of the National Sand and Gravel and National Ready Mixed Concrete Associations.

H. C. Krause, chairman of the committee on percentage depletion, was able to report only the present status of the legislation pending in the United States Senate. The U. S. House of Representatives has passed the revenue bill which permits a percentage depletion allowance in cost keeping of many mineral industries including stone, but at this writing the Senate had yet to act.

O. M. Graves, chairman of the committee on convention arrangements, reported briefly on the general plan of the convention, which will be more of a joint convention with the Agricultural Limestone Institute than has been the case heretofore. In order to economize in time, some of the sessions will include both groups. The operating session will start at 8:30 a.m. on Tuesday, on the theory that an early start will be no particular hardship for the operating men. The convention will start Saturday evening, following the close of the sand and gravel and ready-mixed concrete conventions, with the Manufacturers Division cocktail party, according to tentative plans.

G. A. Austin, reporting as chairman of the membership committee, which comprises all the members of the board of directors, devoted his talk chiefly to praise of the cooperation he had received from the members.

Warren G. Rowe, chairman of the committee on group insurance, submitted a written report, which went into considerable detail as to costs and coverage of life and accidental death and dismemberment policies written for a group of relatively small crushed stone producers.

### Meeting Dates

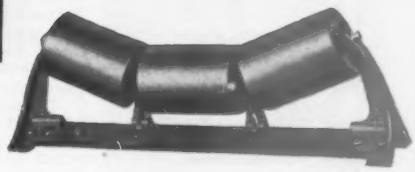
The next annual convention and machinery exhibit will be at the Stevens Hotel in Chicago, the week of February 17, as announced a year ago. The mid-year board of directors meeting will be held again at Hot Springs, Va., and the 1953 convention, according to present plans, at the Netherland-Plaza Hotel, Cincinnati, the last week in January.

The following members of the board of directors were present: J. Reid Callanan, president and chairman of the

# *The Right Equipment · · · Engineering Experience · · · Background*

**Three most important requisites. Put them all together . . they spell RELIABILITY. Jeffrey has all three . . can put them to work for you . can help you speed all sorts of material on its way. Single units or complete systems backed by sound engineering and over 70 years of experience. To do that material handling job exactly and economically . . call on Jeffrey.**

- Apron Conveyors
- Belt Conveyors
- Bin Valves
- Bucket Elevators
- Car Pullers
- Coal Preparation Equipment
- Chains
- Coolers
- Crushers
- Dryers
- Feeders
- Idlers (belt)
- Jigs (coal washing)
- Magnetic Separators
- Pivoted Bucket Conveyors
- Pulverizers
- Scraper Conveyors
- Screens
- Spiral Conveyors
- Skip Hoists
- Sprockets
- Transmission Machinery
- V-Bucket Conveyors



Jeffrey carrying and return Idlers, equipped with Timken tapered roller bearings, are designed for belt conveyor service where efficiency, dependability and economy are desired. Available in four types.

**Your inquiry will be given prompt attention. Costs lurk in unexpected places — likely our Jeffrey engineers have worked out a solution to a problem similar to yours. Write today.**

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Complete Line of Material Handling, Processing and Mining Equipment

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Birmingham 3 Chicago 1 Denver 2 Houston 2 New York 7 St. Louis 1

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*The Ohio Malleable Iron Co., Columbus, Ohio*
*British Jeffrey-Diamond Ltd., Wakefield, England*
*The Galion Iron Works & Mfg. Co., Galion, Ohio*
*The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio*

board; G. A. Austin (past-president); L. J. Boxley, Bruce S. Campbell, T. C. Cooke, Arthur F. Eggleston, Wilson P. Foss III, Norman E. Kelb, H. C. Krause, A. W. McThenia, S. P. Moore, V. C. Morgan, John H. Odenbach, H. E. Rainer, Russell Rarey, Warren C. Rowe, James Savage (treasurer); Margaret McD. Smith, O. M. Stull, F. B. Thatcher, D. L. Williams, W. F. Wise, A. L. Worthen, Otho M. Graves, P. E. Heim, Cottrell Farrell, B. R. Maloney, J. Craig McLanahan, J. A. Rigg, Stirling Tomkins.

## Pyrophyllite Mining

CAROLINA PYROPHYLLITE CO., subsidiary of United Feldspar & Minerals Corp., Spruce Pine, N. C., recently began mining pyrophyllite on a commercial basis in the Bowling mountain section of Granville county. Shipments are being made to Staley, N. C., where the company has its processing plant.

## N.A.L.A. Midsummer Meeting

ALMOST 90 MEMBERS and guests were present from 19 states at the mid-year meeting of the National Agricultural Limestone Association, held June 13 and 14 in Chicago, Ill.

This meeting, like past summer meetings, was called for a complete discussion of association activities and to acquaint the guests and new members with the background and objectives of the organization. Legislative matters emanating from Washington because of the emergency came in for much discussion as did the prospective merger of the association with the Agricultural Limestone Institute.

The annual reception and banquet was held the evening of June 13, and Mrs. Alvin Armbrust and Mrs. Arthur Alvis were on hand as hostesses to provide entertainment for the ladies. President Vincent Shea presided over the meetings.

There was much discussion of the proposed merger of the two national associations representing agricultural limestone producers, and the result of the discussion was the unanimous opinion that every effort be made to effect the merger. There is a sincere desire by both groups to join forces and each has appointed a committee for further discussion of details.

Chairman Haun of the percentage depletion committee summarized the work done. Work will continue to secure percentage depletion benefits for the industry but Mr. Haun was not hopeful that President Truman would sign the bill granting depletion allowances if it be approved by the House and Senate. The House Ways and Means Committee has already expressed itself as endorsing a 5 percent allowance for the crushed stone industry and 15 percent for chemical and metallurgical grade limestone.

Chairman Patton of the membership committee reported that the mailing of membership promotional letters

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***For better performance on quarry excavating equipment it's ROEBLING rope***

FOR EASY HANDLING, extra toughness and service life, there's nothing like Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel—made only by Roebling—gives rope top resistance to abrasion and fatigue. And Roebling Preforming gives you a rope that spools better...doesn't tend to set or kink...minimizes vibration and whipping.

There is a Roebling wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field man help choose the rope that will give you the best and the lowest-cost performance. Still further savings may be effected by following his suggestions about the proper installation, use and maintenance of wire rope. John A. Roebling's Sons Company, Trenton 2, New Jersey.

# ROEBLING

***Atlanta,*** 934 Avon Ave ★ ***Boston,*** 51 Sleeper St ★ ***Chicago,*** 5525 W. Roosevelt Rd ★ ***Cincinnati,*** 3253 Fredonia Ave ★ ***Cleveland,*** 701 St. Clair Ave, N.E. ★ ***Denver,*** 4801 Jackson St ★ ***Detroit,*** 915 Fisher Building ★ ***Houston,*** 6216 Navigation Blvd ★ ***Los Angeles,*** 216 S. Alameda St ★ ***New York,*** 19 Rector St ★ ***Odessa, Texas,*** 1920 E. 2nd St ★ ***Philadelphia,*** 230 Vine St ★ ***San Francisco,*** 1740 17th St ★ ***Seattle,*** 900 1st Ave, S. ★ ***Tulsa,*** 321 N. Cheyenne St ★ Export Sales Office, ***Trenton, N. J.***

was discontinued this year, thus far, principally because the association now has a large percentage of high-caliber members who are leaders in the industry. Something over 100,000 letters were mailed out during the past year. Efforts are to be resumed to add non-members to the roll.

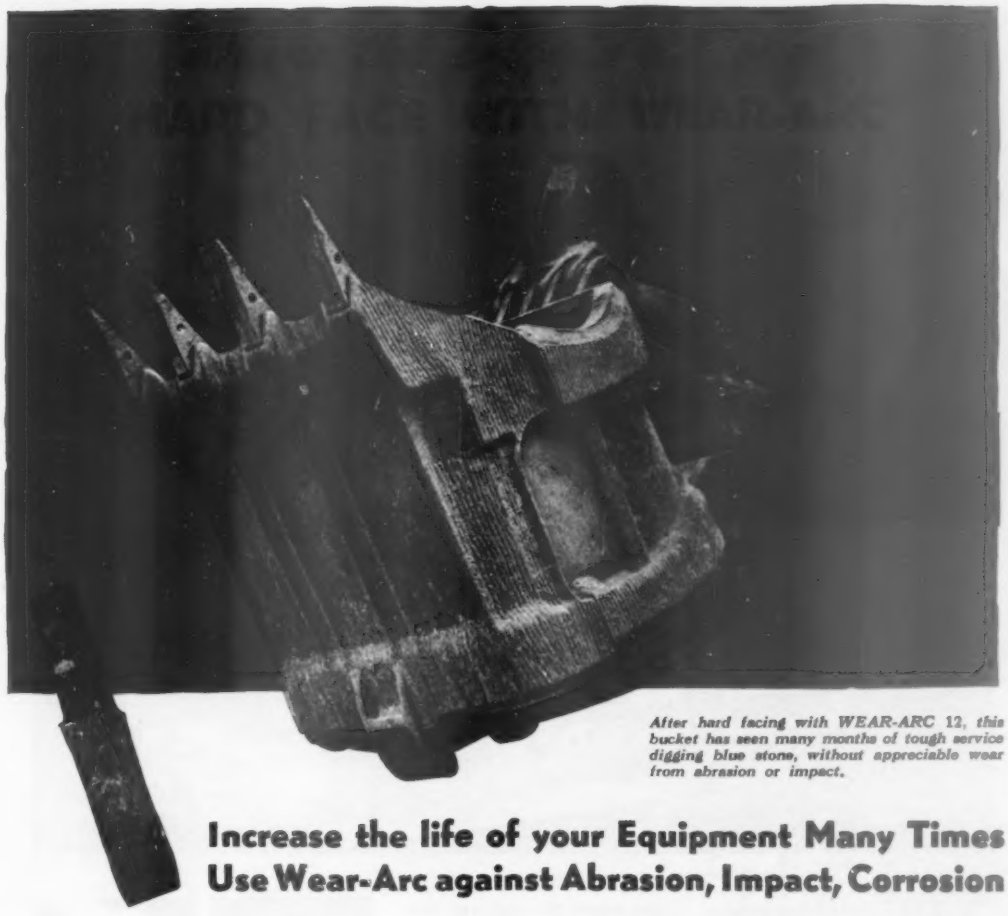
Jack Deely was called upon to tell new members and guests the objectives and accomplishments of the association.

Executive secretary Robert Koch briefly touched upon legislation affecting the industry, principally the serialization of quarries for the purpose of getting equipment and supplies, and regulations issued by the Office of Price Stabilization. There have been changes to regulations since this meeting, which have been reported by Mr. Koch to his membership, and in the press, so we omit detailed discussion of these regulations in this report.

Mr. Koch also commented briefly on sales promotion activities of the association which have been accelerated in the past several years. The bi-monthly news releases have been going out to some 1000 rural newspapers in areas where member companies are doing business. Mr. Koch said that these news releases will be sent out without charge if members will supply the names of newspaper publishers. His talk on the status of A.C.P. appropriations and activities of the Washington staff was scheduled for presentation at the annual dinner.

Much of the final meeting on Thursday was also devoted to observations by Mr. Koch on legislation and the accomplishments of the association. Promotional work is just getting underway, Mr. Koch said, with preparation of blotters for distribution by members. One producer described an arrangement in his area by which a local publisher will compile and print a magazine, using any of the producer's copy or information, and send copies to farmers, all for 2 cents a copy. Since this is in effect the producer's own magazine, he can put anything of interest in it. The value of the publication would lie in the opportunity to educate farmers about the value of liming. In the discussion that followed, many questioned the value of such an undertaking in contract areas, but all agreed that a state or regional magazine would have many merits.

Mr. Koch said that in his opinion most producers were not familiar with federal laws governing agriculture and advised them to learn. He said that N.A.L.A. should attempt to educate producers about their rights, and what can and cannot be changed. Many detrimental rules have been devised by county offices. These stem from misinterpretation of rules set up by P.M.A. Some counties are using unfair influence to lower agstone prices. Fewer cases of these would result if producers knew their rights, Mr. Koch repeated.



*After hard facing with WEAR-ARC 12, this bucket has seen many months of tough service digging blue stone, without appreciable wear from abrasion or impact.*

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WEAR-ARC WH is ideal for build up on manganese steel; WEAR-ARC 12 for providing that hard wearing surface. Ask for bulletin No. 10550, illustrating and describing properties and welding procedures for the complete line of WEAR-ARC hard facing alloys.

## "I Like the rod that comes in the RED can"

SEE YOUR NEAREST
ALLOY RODS DISTRIBUTOR

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## Kiln Efficiency

(Continued from page 164)

may be considered reliable.

Some may want to take the better of the wet system kiln of 29 percent thermal efficiency, add the water as useful and evaluate it at 62 percent as shown. This would create a queer comparison with the Lawrence dry process kiln and on the basis of this alone it is proved that only the lower, the "dry," and not the upper "wet" curve should be used.

There are other curves for high calcium lime, dolomite and magnesite. In the case of high calcium lime, some poor rotary kilns require as much as 11,000,000 B.t.u. per ton but their efficiency of 25 percent still classes them among the better compared to cement kilns. The best lime rotary kilns have an efficiency of 40 percent and the dotted extension indicates the trend of improvement. On the same line are the better of the gas-fired vertical lime kilns followed by the highest efficiency thermal performer, the mixed feed lime kiln, which may reach the 80 percent efficiency point and pass off gases with 42 percent $CO_2$ content, when cement kiln gases may contain less than 25 percent.

There are some reasons, of course. Some are apparent, others are not. Some can be corrected and others can not. But whether they can be corrected or not, they must be known and in as far as possible thoroughly investigated and placed in the plain light of understanding.

We realize that much depends on the mineralogical assembly of the components, that results may vary from plant to plant. On this account not every finding and rule would apply exactly to every case, but most would. For example, a study of the flow of the mass will bring up the questions—does it roll or slide or shear? Does it progress on an even or unequal front? What is its cross sectional temperature and cross section composition? By what manner does heat distribute and at what rate and uniformity? It may not seem important but these fundamentals are the foundation of kiln efficiency.

## Silica Sand for Aircraft

CLAYTON SILICA CO., Clayton, Iowa, a division of Concrete Materials Co., Waterloo, Iowa, is providing silica sand for use by Solar Aircraft Manufacturing Co. of California in its airplane manufacture. Approximately 15 carloads of sand a day are being produced, with the major portion being shipped to the California aircraft company.

Operations at the Clayton plant were started in 1947. In charge of operations is Dean Jones, superintendent. Officers of the company are W. W. Roberts, president; T. E. Rust, vice-president; and F. E. Bellamy, secretary-treasurer.

## Air Blending

*(Continued from page 159)*

Fig. 4 shows the bottom part of a similar installation, where the tanks are made of concrete. Fig. 5 shows the driving arrangement on top of the tanks.

Fig. 6 illustrates by curves the operating figures for a two-day run of a Fluxo homogenizing plant. As will be noted, the $CaCO_3$ content of the raw material varies about 5 percent before the homogenization, and the maximum deviations from the average titration after the homogenization are not more than ± 0.15 percent. Over a longer period there may be larger deviations in the homogenized product, but experience has shown that the degree of homogenization obtained in the Fluxo homogenizing system is well within the limits of requirements for good kiln operation.

As an example of improvements in cement quality obtained by the introduction of the Fluxo homogenizing system, the following laboratory records are quoted from a cement plant, where a Fluxo homogenizer was installed some years ago (see below).

These figures were compiled over a period of several years before and after the installation of the Fluxo homogenizer, and the chemical composition of the raw materials consisting of limestone and hard marl was absolutely unchanged during the whole period. The people in charge of operation have expressed their opinion that the gain in strength of the cement is actually ascribed to the improvement in homogeneity of the raw materials fed to the kilns, because it has resulted in a more uniform burning of the clinker and improved the operation of the kilns.

| | Before installation of Fluxo homogenizer | After installation of Fluxo homogenizer |
|---|---|---|
| Variations in percentage of $CaCO_3$ | ±1.75 | ±0.35 |
| Tensile strength: | | |
| After 3 days | 24-30 kg./sq.cm. | 32-38 kg./sq.cm. |
| After 7 days | 27-38 kg./sq.cm. | 34-40 kg./sq.cm. |
| After 28 days | 34-39 kg./sq.cm. | 37-42 kg./sq.cm. |
| Compressive strength: | | |
| After 3 days | 250-350 kg./sq.cm. | 350-450 kg./sq.cm. |
| After 7 days | 400-450 kg./sq.cm. | 450-550 kg./sq.cm. |
| After 28 days | 500- kg./sq.cm. | 550- kg./sq.cm. |
| Cement fineness on 900 mesh sieve | 0.1-0.2 percent | 0.1 percent |
| Cement fineness on 4900 mesh sieve | 4-6 percent | 5-6 percent |



## Building Material Distributors Meet

F. E. SCHUNDLER & CO., INC., Joliet, Ill., recently held open house and gave demonstrations of the manufacture and use of Coralux perlite aggregate for over 80 Schundler distributors from Ohio, Indiana, Michigan, Kentucky, Illinois, Wisconsin and Iowa.

The building material distributors were taken on a complete tour of the plant, during which time vermiculite manufacturing, Coralux perlite manufacturing and mill operations for insulating cements and acoustical plasters were explained. Following the plant tour, field application demonstrations of lightweight aggregates were conducted by journeymen, plasterers and mechanics. Special emphasis was made on the importance that lightweight aggregate will play in defense construction for the coming year. Fireproofing, steel-saving and labor-saving features were also pointed out to the distributors as definite services they could provide by supplying necessary information of lightweight aggregates to the building and architectural professions in their merchandising areas.

Jack Kingsbury, vice-president of the Schundler company, welcomed the guests at a dinner in the evening. Following the dinner, round-table discussions concerning building conditions and the potentials of lightweight building aggregates in modern construction were held.

# UNLOADING TIME:


FAST UNLOADING of sand and rock resulted in big savings in man-hours and demurrage costs for a large contracting firm when they installed this Allis-Chalmers car shaker.

Carloads of sand pumped from a river are completely unloaded in three runs, each of ½ to ¾ minute duration. Cars of 1 x 6 in. crushed stone are unloaded at this plant in less than one minute!

Owners are pleased, too, with the car shaker's sturdy construction. The body is a one-piece, all-welded structure made of reinforced steel plate and stress-relieved to eliminate welding strains. Totally enclosed motor inside shaker body is cradled in specially designed rubber mountings to protect it from vibration.

Chances are, you can save money in your operations with an Allis-Chalmers car shaker. Call the A-C representative in your area for more facts. Allis-Chalmers, Milwaukee 1, Wisconsin.

**Car Shakers Promote Safety to Personnel!**

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Milwaukee 1, Wis.
Please send my copy of Car Shaker Bulletin 07B7221A.

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## A.S.T.M. Meeting Report

THE FIFTY-FOURTH ANNUAL meeting of American Society for Testing Materials at Atlantic City was characterized by 500 committee and subcommittee meetings, which meant a lively scurry to find rooms and an impossibility of avoiding conflicts. The question arises as to whether at least the subcommittee meetings should not be eliminated at the annual meeting. In the committees involving rock products, C-9 has the greatest complexity of organization with 24 subcommittees in the 1950 year book and more have just been added. Like so many American organizations, A.S.T.M. has become so big and so highly organized that much of the very fine flavor of the early days of small, compact organization has been lost.

As a topic of general interest the alkali attack on aggregate has forged ahead of air entraining and of freezing and thawing tests. Now we hear about *pessimum* amounts of reactive aggregates, where the alkali reaction is most harmful, with intensity of effect diminishing on either side as an excess of one is present to use up all of the other rather early in the game. Stanton Walker reported less expansion when he actually added sodium hydroxide to the mix, in support of the pessimum theory.

The role of the rigidity of the concrete seems to be emerging as of some importance. This means that concrete at early ages has more plastic flow than later, and that at later ages, especially with a period of mild baking, as proposed by A. D. Conrow, of Ash Grove Lime and Portland Cement Co., the disruptive effects of the reaction may become very severe.

George C. Wilsnack demonstrated two pieces of apparatus weighing 192 lb., which he had brought on from Colorado. This effort was rewarded by the keen interest shown in the apparatus and in appreciation of their potential value. For mixing, Mr. Wilsnack had added a special mixing blade and rubber scraper to a Hobart Kitchen-Aid. This cost him $25.

The design was shown. A speed of 80±2 r.p.m. was suggested as reproducing a result close to the average of several operators mixing by hand. Certainly any reduction in the personal factor is to be desired and this apparatus offers some advantages in this respect.

Emulating Reed-Lewis, who was so active 25 years ago in studying workability problems, Mr. Wilsnack has constructed a special apparatus for measuring mobility in mortars. A plunger is pushed into a cup of mortar, the areas of the plunger and inside of the cup having the ratio of 1:3. A collar is provided to contain the mortar displaced by the plunger. A series of curves was shown covering some of the interesting results obtainable with this apparatus.

The results obtained with three 1:3 mortars containing Ottawa sand were

**FOR USE IN PITS-MINES and QUARRIES**

3 ways

1. The McLanahan Single Roll Rockmaster Crusher is low in cost. Few parts for construction make it less expensive to build.
2. The McLanahan Rockmaster Crusher makes possible less operating cost because of [illegible] crushing capacity per pound.
3. The McLanahan Rockmaster Crusher requires a minimum of repairs due to simplified construction.

*with* McLANAHAN *Single Roll*

# ROCKMASTER CRUSHERS

Extremely popular in pits, mines, quarries, cement, furnace and open hearth slag plants . . . these heavy duty machines have exceptional capacities because they crush material constantly. All steel construction with cut steel gears, heavy split phosphor bronze bearings, automatic steelstrut toggle for adjustment and tramp iron protection, interchangeable and reversible crushing plate liners on improved removable bronze bushed crushing plate, heavy balanced V-grooved pulley . . . McLanahan Rockmaster Crushers are rugged and modern. They are the answer to *your* crushing problems.

*Write* today for Bulletin RM-505

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**Dependable Products:** Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Reactors, Sawdusts, Shovels, Ballast, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.

given, including a Type I cement, the same with 15 percent lime added, and a masonry cement containing entrained air. These were all brought close to the same flow on the flow table (105 to 110 percent) but the pressures required to produce a 4 cm. to 8 cm. penetration differed greatly.

The area to the left of the curves which were shown, in the 4 to 8 cm. penetration range, gave a measure of the integrated work required and therefrom a "relative plasticity index" is set up. This was shown as plotted against the air content for a series of mortars. Curves were shown for mortars in which the ratio of cement clinker to limestone-shale varies slightly, with the 60:40 ratio apparently giving best results. Also the effect of another air-entraining agent was given.

In C-12, Masonry Mortars, under the leadership of the new chairman, J. M. Hardesty of Bell Telephone Laboratory, a general specification for masonry mortar has finally been adopted and progress has been made in the aggregate subcommittee in setting up a new specification including provisions for a manufactured sand.

F. O. ANDEREGG.

## Safety Trophy Awards

THE "SENTINELS OF SAFETY" trophies, signifying outstanding safety achievements during 1950, were awarded to leading companies in six classes of mineral operations, in the 26th National Safety Competition conducted by the Bureau of Mines. Certificates of Achievement in Safety were also awarded to 134 other mines, quarries and open pit operations which finished second, third, fourth and fifth in their respective groups, or which operated 30,000 or more man-hours in 1950 without a lost-time injury.

Trophy winner for underground nonmetallic mines was the Barberton limestone mine of Pittsburgh Plate Glass Co., Barberton, Ohio, for working 402,775 man-hours without a lost-time injury. The Rogers City quarry of Michigan Limestone & Chemical Co., Rogers City, Mich., working 1,273,376 man-hours without a lost-time injury, was the winner for stone quarries.

Nonmetallic mineral mines winners of certificate awards were:

Kimballton lime mine, Kimballton, Va., operated by The Standard Lime & Stone Co.
Kimballton lime mine, Kimballton, Va., operated by National Gypsum Co.
Sugar Creek limestone & shale mine, Sugar Creek, Mo., operated by Missouri Portland Cement Co.
Crestmore limestone mine, Riverside, Calif., operated by Riverside Cement Co.
Manheim cement-rock mine, Manheim, W. Va., operated by Alpha Portland Cement Co.
Grand Rapids gypsum mine, Grand Rapids, Mich., operated by Certain-teed Products Corp.
Charmain greenstone mine, Blue Ridge Summit, Penn., operated by The Funkhouser Co.
Number 3 shale mine, Hannibal, Mo., operated by Universal Atlas Cement Co.
Acme gypsum mine, Acme, Texas, operated by Certain-teed Products Corp.
Fairmount slate mine, Fairmount, Ga., operated by The Funkhouser Co.
Marblehead agstone mine, Marblehead, Ill., operated by Marblehead Lime Co.

Certificate winners in the quarries classification were the following:

Bridgeport limestone quarry, Bridgeport, Penn., operated by Bethlehem Steel Co.
Columbia limestone quarry No. 1, Columbia, Ill., operated by Columbia Quarry Co.
Nazimey limestone quarry, Nazimey, Penn., operated by Bethlehem Steel Co.
Bailey Falls limestone quarry, Oglesby, Ill., operated by Marquette Cement Manufacturing Co.
Number 5 limestone quarry, Hannibal, Mo., operated by Universal Atlas Cement Co.
Number 4 cement-rock quarry, Nazareth, Penn., operated by Pennsylvania-Dixie Cement Corp.
Frazier limestone quarry, East Fultonham, Ohio, operated by Pittsburgh Plate Glass Co.
Steelton limestone quarry, Steelton, Penn., operated by Bethlehem Steel Co.
Gate City limestone quarry, Gate City, Va., operated by Pennsylvania-Dixie Cement Corp.
Number 1 limestone quarry, Coeymens, N. Y., operated by Callanan Road Improvement Co.
Dixon limestone quarry, Dixon, Ill., operated by Medusa Portland Cement Co.
Ohio dolomite quarry, Millersville, Ohio, operated by The J. E. Baker Co.
Jensen limestone quarry, Riverside, Calif., operated by Riverside Cement Co.
Fogelsville limestone & cement-stone quarry, Fogelsville, Penn., operated by Lehigh Portland Cement Co.
Klondike limestone quarry, Oro Grande, Calif., operated by Riverside Cement Co.
Wampum limestone quarry, Wampum, Penn., operated by Medusa Portland Cement Co.
Southwestern limestone quarry, Fairborn, Ohio, operated by Southwestern Portland Cement Co.
Clinchfield limestone quarry, Clinchfield, Ga., operated by Pennsylvania-Dixie Cement Corp.
North Branford No. 7 crushed trap rock quarry, North Branford, Conn., operated by The New Haven Trap Rock Co.
Bethlehem limestone quarry, Bethlehem, Penn., operated by Bethlehem Steel Co.
Billmeyer dolomite quarry, Bainbridge, Penn., operated by The J. E. Baker Co.
Oglesby limestone quarry, Oglesby, Ill., operated by Lehigh Portland Cement Co.
Gibsonburg lime & limestone quarry, Gibsonburg, Ohio, operated by The Kelley Island Lime and Transport Co.
Martins Creek cement-rock quarry, Martins Creek, Penn., operated by Alpha Portland Cement Co.
Davenport limestone quarry, Linwood, Iowa, operated by Dewey Portland Cement Co.
Nazareth cement-rock quarry, Nazareth, Penn., operated by Lone Star Cement Corp.
Stockertown cement-rock quarry, Stockertown, Penn., operated by Hercules Cement Corp.
Portland limestone & shale quarry, Portland, Colo., operated by Ideal Cement Co.
Watertown limestone quarry, Watertown, N. Y., operated by The General Crushed Stone Co.
Number 3 cement-rock quarry, West Coplay, Penn., operated by Coplay Cement Manufacturing Co.
Ormrod limestone & cement-stone quarry, Ormrod, Penn., operated by Lehigh Portland Cement Co.
Dallas limestone quarry, Dallas, Texas, operated by General Portland Cement Co., (Trinity Portland Cement Division).
Monroe quarry, Monroe, Mich., operated by The France Stone Co.
Northampton cement-rock quarry, Northampton, Penn., operated by Universal Atlas Cement Co.
Silica crushed stone quarry, Sylvania, Ohio, operated by Toledo Stone & Glass Sand Co.
Martha limestone quarry, Lebanon, Tenn., operated by Marquette Cement Manufacturing Co.
Petoskey crushed limestone quarry, Petoskey, Mich., operated by Petoskey Portland Cement Co.
Oriskany Falls limestone No. 5 quarry, Oriskany Falls, N. Y., operated by Eastern Rock Products, Inc.
Greencastle limestone quarry, Greencastle, Ind., operated by Lone Star Cement Corp.
LaSalle quarry, LaSalle, Ill., operated by Alpha Portland Cement Co.
Keystone cement-rock quarry, Bath, Penn., operated by Keystone Portland Cement Co.
Auburn limestone quarry, Auburn, N. Y., operated by The General Crushed Stone Co.
Fort Worth limestone quarry, Fort Worth, Texas, operated by General Portland Cement Co., (Trinity Portland Cement Division).
Marquette limestone quarry, Earlham, Iowa, operated by Marquette Cement Manufacturing Co.
Inwood limestone quarry, Inwood, W. Va., operated by The J. E. Baker Co.
Thomaston limestone quarry, Thomaston, Maine, operated by Lawrence Portland Cement Co.

Jordanville limestone quarry, Jordanville, N. Y., operated by The General Crushed Stone Co.
Galloway lime & rock quarry, Galloway, Mo., operated by Ash Grove Lime and Portland Cement Co.
Keeport crushed stone quarry, Logansport, Ind., operated by The France Stone Co.
Blue Mount trap rock quarry, Blue Mount, Md., operated by The J. E. Baker Co.
Birmingham limestone quarry, Birmingham, Ala., operated by Lone Star Cement Corp.
Hudson limestone quarry, Hudson, N. Y., operated by Lone Star Cement Corp.
Sylvania limestone quarry, Sylvania, Ohio, operated by Medusa Portland Cement Co.
Superior limestone quarry, Superior, Neb., operated by Ideal Cement Co.
Huntington quarry, Huntington, Ind., operated by Erie Stone Co.
Sandt's Eddy cement-rock quarry Easton, Penn., operated by Lehigh Portland Cement Co.
Genoa dolomitic limestone quarry, Genoa, Ohio, operated by United States Gypsum Co.
Gibsonburg limestone quarry, Gibsonburg, Ohio, operated by National Mortar & Supply Co.
National City gypsum quarry, National City, Mich., operated by National Gypsum Co.
Middlefield No. 1 trap rock quarry, Middlefield, Conn., operated by New Haven Trap Rock Co.
Birmingham quarry, Birmingham, Ala., operated by Alpha Portland Cement Co.
Bethlehem quarry, Bethlehem, Penn., operated by National Portland Cement Co.
Sugar Creek limestone & shale quarry, Sugar Creek, Mo., operated by Missouri Portland Cement Co.
Thomasville quarry, Thomasville, Penn., operated by The J. E. Baker Co.
Zanesville limestone quarry, White Cottage, Ohio, operated by Sidwell Brothers Co.
Devil's Slide limestone quarry, Morgan, Utah, operated by Ideal Cement Co.
Iola limestone & shale quarry, Iola, Kan., operated by Lehigh Portland Cement Co.
St. Cloud granite quarry, Waite Park, Minn., operated by Shiely-Petters Crushed Stone Co.
Lehigh limestone and Brownstown shale quarry, Mitchell and Brownstown, Ind., operated by Lehigh Portland Cement Co.
Charmian greenstone quarry, Blue Ridge Summit, Penn., operated by The Funkhouser Co.
Marquette limestone quarry, Cape Girardeau, Mo., operated by Marquette Cement Manufacturing Co.
Spencer quarry, Spencer, Ind., operated by France Stone Products, Inc.
Union Bridge limestone quarry, Union Bridge, Md., operated by Lehigh Portland Cement Co.
Bluffton stone quarry, Bluffton, Ind., operated by The Erie Stone Co.
Howes Cave limestone quarry, Howes Cave, N. Y., operated by North American Cement Corp.
Evansville cement-rock quarry, Evansville, Penn., operated by Allentown Portland Cement Co.
Boettcher limestone & shale quarry, Ft. Collins, Colo., operated by Ideal Cement Co.
Evans limestone quarry, Evans, Wash., operated by United States Gypsum Co.
Number 4 trap rock quarry, Knippa, Texas, operated by Southwest Stone Co.
Knoxville lime quarry, Knoxville, Tenn., operated by The Standard Lime and Stone Co.
Middle Falls quarry, Middle Falls, N. Y., operated by Hudson Valley Sand & Stone Co.
Montgomery trap rock quarry, Montgomeryville, Penn., operated by Montgomery Stone Co.
Georgetown limestone quarry, Georgetown, Ohio, operated by Hanna Coal Co., (division of Pittsburgh Consolidated Coal Co.).

## Accelerated Amortization

LONE STAR CEMENT CORP., New York, N. Y., was recently issued a certificate of necessity for accelerated tax amortization on new or expanded facilities by the Defense Production Administration, permitting a 70 percent tax amortization write-off on $10,004,300 of its $10,372,000 project at Lone Star, Va.

According to D.P.A., the purpose of the program is to expand private industry's production capacity quickly for mobilization by allowing rapid tax write-offs during a 5-year period.

## Wants Cement Machinery

IT WAS RECENTLY REPORTED in *Cement and Lime Manufacture* that "Cimenterie d'Albertville-Cimental," with a capital of Frs. 40,000,000, has been formed with the principal object of exploiting limestone deposits near Kabimba Bay on Lake Tanganyika, and to produce chalk and cement from the limestone quarried. It is understood that the company wishes to receive catalogs and technical literature from manufacturers of machinery and supplies for cement plants. Catalogs should be sent to Monsieur Freys, Cimenterie d'Albertville "Cimental," 112, Rue du Commerce, Brussels.

## Cement Company Receives Loan for Expansion

CAROLINA GIANT CEMENT CO., Harleyville, S. C., has received approval by the Reconstruction Finance Corp. for a $4,500,000 loan to finance new buildings and to buy and install new machinery and equipment. The loan was approved in the interest of national defense. The interest rate is 5 percent and the loan will mature in seven years.

The company is the nearest cement plant to the Atomic Energy Commission's Savannah River project which is about 85 miles distant. There are no other cement plants located in South Carolina, which has resulted in an acute cement shortage in that area.

## Calaveras Expansion

CALAVERAS CEMENT CO., San Francisco, Calif., recently announced that the elimination of construction "bottlenecks" may enable the company to put its new fourth kiln into operation 90 days ahead of schedule. Ground was recently broken for the kiln piers. The new kiln, originally scheduled to begin production in June, 1952, now is expected to be in operation by March, and it will increase the company's output of clinker by 50 percent.

Other speed-ups in the company's $2,234,106 expansion program at the San Andreas, Calif., plant, are expected to increase the production of cement as early as October of this year. The increase will approximate 10 percent between October, 1951 and March, 1952, rising to 25 percent in March, and 50 percent in June.

It was stated that the speed-up was made possible by issuance of government priorities for installation of the kiln. The company has already been issued a certificate of necessity, permitting rapid amortization of the cost of the expansion program, which will provide tax relief over a period of five years. To help hasten delivery of the kiln, Allis-Chalmers Manufacturing Co. has subcontracted with Moore Dry Dock Co. for construction of the 360-ft. kiln shell at Oakland, Calif. Other parts of the kiln will be built at the Allis-Chalmers plant in Milwaukee, Wis.

# INFORMATION

## TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

1 **BELTING**—Quaker Rubber Corp. has developed a "Conservation Maintenance Plan" which includes a handbook, wall charts and monthly bulletins. These data contain many illustrations and suggestions on selection, installation and maintenance of conveyor belting, flat transmission belting, V-belts, hose and packing.

2 **BUCKET MAINTENANCE** — Blaw-Knox Co. has announced the publication of Bulletin No. 2373, which describes maintenance and care of clamshell buckets and gives diagrammed instructions for the replacement of component parts. Included in the 42-page booklet are suggestions on proper use.

3 **CAR SHAKER** — Allis-Chalmers Manufacturing Co. has released Bulletin 07B7221A, describing and illustrating its car shaker for unloading granular material from hopper-bottom gondola cars. Construction features, specifications, applications and a cross section view through the vibrating mechanism are included.

4 **CHAIN CONVEYORS**—Chain Belt Co. has released a 12-page bulletin, No. 50-35, which stresses the importance of careful selection of chain conveyors in the instances where they apply. Numerous photographs and sketches are included in the booklet.

5 **COMBUSTION CONTROL** — The Hays Corp. has announced the availability of five case histories on combustion control. A schematic drawing and a number of photographs are included in each report to facilitate understanding of the installations.

6 **COMPRESSION MACHINE** — Forney's Inc. has issued a 4-page release, Bulletin 102, describing and illustrating its compression tester. A drawing of the tester indicates the important features of the machine.

7 **CONCRETE MIXER**—Kwik-Mix Co. has announced the release of Bulletin 313, describing and illustrating all recent improvements made on the new three-bag capacity concrete mixer, Model 16-S. Schematic drawings, with detailed dimensions, are included in the catalog along with specifications on the extension truck and tower loader attachments.

8 **CONCRETE PUMP**— Chain Belt Co. has released a revised bulletin, No. 51-31, on Rex Pumpcrete, a machine that pumps concrete through a pipe line. The booklet discusses the pump itself, methods of operation, types of mixes it will handle, and height and distance requirements of a placing job.

9 **CONTROLLERS** — The Bristol Co. has published a 32-page bulletin, No. A120, describing its Series 500 air-operated controllers. Complete data with pictures are given on on-off, proportional, reset, derivative and reset plus derivative models.

10 **CONVEYORS & LOADERS** — Athey Products Corp. has announced publication of the company's 1951 condensed pocket size catalog, describing and illustrating, as far as possible, all Athey products.

11 **CONVEYOR**—Brady Conveyors Corp. has released a bulletin on its Flo-Veyor for the handling of dry granular materials, such as cement and sand. Diagrams and descriptive data are included in the pamphlet.

12 **CRUSHERS** — American Pulverizer Co. has announced Bulletin No. 147, describing and illustrating the construction features, dimensions and capacities of its line of hammermills. Typical installations are listed along with tables of capacities and ratings.

13 **DIESELS**—Cummins Engine Co., Inc. has published Bulletin No. 5314-SM, describing and illustrating diesel power units for use in the crushed stone, agricultural limestone and sand and gravel fields. Photographs, data and specifications are included for each machine.

14 **DIESELS**—Euclid Road Machinery Co. has published a 16-page booklet, describing five diesels manufactured by the Cummins Engine Co., Columbus, Ind., and 11 standard models of Euclid equipment that they power. The booklet is entitled "Cummins Powered Euclid Equipment."

15 **DIESEL ENGINES**—Nordberg Manufacturing Co. has announced publication of Bulletin 163, which describes and illustrates the Nordberg Type 4FS, one- and two-cyl., 4½-x 6½-in. diesel engines, rated at from 10 to 30 hp. at 1200 to 1800 r.p.m. Construction and operation features and pictures of all main engine parts along with their particular specifications are included.

16 **DIPPER TEETH**—The Stulz-Sickles Co. has released its latest "Manganal Marketer," Vol. 2, No. 9, giving facts on the use of Manganal 11 to 13½ percent manganese-nickel steel products, for salvaging worn dipper teeth. Detailed information is included with accompanying illustrations.

17 **DRILLS**—Joy Manufacturing Co. has announced the release of a 12-page bulletin, D-36, describing its Champion blast hole drill and the method of "rotary air blast" drilling. Also discussed are construction features of the drill, typical applications, and examples of footage and bit life in those applications.

18 **DUST CONTROL** — American Wheelabrator & Equipment Corp. has published the first issue of "Industrial Ventilation," a new periodical devoted to the latest developments in industrial dust and fume control. The issue contains illustrated case histories and a technical discussion on the application of cloth-tube filters.

19 **DUST PREVENTATIVE** — Aquadyne Corp. has published a brochure on wet water and its possibilities for industry. Entitled "Wet Water—what it is and what it can do for you," it is a layman's description of the current industrial applications of wet water and the system of making an economic supply available without elaborate equipment.

20 **ELECTRICAL REVIEW** — Allis-Chalmers Manufacturing Co. has issued its Electrical Review for the first quarter of 1951. Its 29-pages include four articles: "Power for a Modern Blooming, Bar and Billet Mill," "Packaged Bus Protects Electrical Conductors," "From Candle Power to KW," and "24,000-Hp Dynamometer Tests Jet Engines."

21 **ELECTRIC CONTROL** — Minneapolis-Honeywell Regulator Co., Industrial Division, has announced the publication of a 36-page catalog, 15-15, covering ElectroniK electric control potentiometers for both contact and proportional control. Engineering and constructional data, types of control, application data, and accessories are described.

22 **ELECTRODES**—Rankin Manufacturing Co. has issued Bulletin B-X, containing complete information, including prices, on the Ranits B-X hard surfacing electrode. The release includes specifications and photographs.

23 **ELECTRONICS** — General Electric Co. has published a booklet, "Electronics in the Public Interest" based on a talk given to foremen at Electronics Park, Syracuse, by Dr. W. R. G. Baker, a vice-president and general manager of the company's electronics department.

24 **EQUIPMENT DEVELOPMENTS**—Caterpillar Tractor Co. has released a booklet, "Seeds of Victory," in the interest of maintaining a strong military and national defense program. Photographs and descriptive data show how the company, through its products, is striving to meet the crises now facing the world.

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**25** FILTERS—Dollinger Corp. has released a bulletin describing its complete line of pipe line filters for air and other gases. The 8-page booklet illustrates and gives specifications for 75 filters, including pressure and vacuum types.

**26** FOAMING AGENT—Masonite Corp. has released Technical Bulletin No. CD-6A, describing the development of Masonoid CTM as a foaming and foam stabilizing agent comparable in some applications to soap bark.

**27** FORK TRUCKS—Silent Hoist & Crane Co. has announced the publication of Bulletin No. 77, describing its line of heavy-duty fork lift trucks, of 5-, 7½- and 10-ton capacities. Complete specifications are listed.

**28** FORK TRUCKS—Towmotor Corp. has published a release, DM-1, describing and illustrating its fork lift trucks for mass handling. Diagrams showing important features are included in the bulletin.

**29** FREEZEPROOFING—Calcium Chloride Association has issued a pamphlet on freeze-proofing coal and iron ore shipments with calcium chloride. Photographs of applications and a table of specifications are included.

**30** GEARS—General Electric Co. has announced as available an 8-page bulletin, No. GEA-1084B, on pinions and gears for transportation equipment. The publication also describes, pictorially, the company's testing facilities for gear manufacturing, and provides a nationwide list of gear sales outlets and apparatus service shops.

**31** GENERATORS — General Electric Co. has announced as available a 4-page bulletin, GEA-5470, which covers generators for standby, portable and prime source power in ratings from 1.875 to 50 kv.-a. with frequencies of 60 and 400 cycles. Four designs are described in the bulletin: externally-regulated, self-regulated, packaged-regulated 4-pole synchronous generators, and high-frequency 14-pole synchronous generators.

**32** HYDRAULIC CONTROL — Harnischfeger Corp. has released a pocket-sized guide on the operation and care of hydraulic control of P&H power cranes and shovels. The 28-page booklet contains information on the system itself and describes the correct procedure for dismantling, adjusting and replacing parts.

**33** INSTRUMENTS—Fisher Scientific Co. has issued a 6-page folder listing 37 new items which have been made available since the company published its most recent catalog supplement. Scientific instruments, laboratory apparatus and safety devices are described and illustrated.

**34** INSULATION—Zonolite Co. has issued a 12-page illustrated booklet, describing proper application of all forms of Zonolite vermiculite. Design data, methods and specifications are outlined in the publication.

**35** KILN CONTROLS—Minneapolis-Honeywell Regulator Co. has issued Catalog 81-1, covering furnace and oven controls. The 28-page illustrated bulletin lists and prices a variety of instruments such as temperature controllers, recorders and indicators; electric- and pneumatic-operated control valves; relays; control motors; and safety control equipment.

**36** LIFT TRUCKS — Towmotor Corp. has published a 4-page folder, No. 5P-7, especially suitable for industrial users of lift trucks who are faced with unusually difficult handling problems. Illustrated and described are devices designed to grip, clamp, grab or support almost any load, and lift, transport, unload, deposit, dump, up-end or revolve it.

**37** LIMESTONE SPREADER — Highway Equipment Co., Inc. has released a bulletin illustrating and describing its combination commercial fertilizer and limestone spreader. Complete details are included in the release.

**38** MACHINERY MAINTENANCE—Caterpillar Tractor Co. has released a 12-page illustrated booklet, Form 30171, which emphasizes the importance of maintaining machinery. Mechanical service, parts service and application service are described.

**39** MASONRY CUTTING—Everready Brik-saw Co. has released Booklet 101, entitled "How to Cut Blade Costs in Masonry Cutting" which gives practical illustrated instructions on how to figure blade costs in masonry cutting before starting full cutting operations.

**40** MOTOR PROTECTION—Westinghouse Electric Corp. has published a 12-page high-voltage combination-starter booklet, DB-4673, describing co-ordinated protection—interlinked protection of circuits, motors and personnel. Comparative discussions and keyed photographs are shown in the bulletin.

**41** OIL RECLAIMER—The Hilliard Corp. has published Bulletin No. R-238 describing and illustrating its Hilco oil reclaimer. Photographs, complete descriptions and a detailed diagram of the unit are featured in the leaflet.

**42** PALLET TRUCK—Towmotor Corp. has announced publication of an 18-page booklet, No. 3P-8, describing and illustrating details of the Model "W" Towmotor electric pallet truck. Diagrams, photographs and cross sections are liberally used in the catalog.

**43** PERLITE—Great Lakes Carbon Corp., Building Products Div., has issued a general brochure on Permalite lightweight plaster aggregate, describing recommended mixes and applications and properties of the plaster. Also included are a short form specification chart for use by architects and a chart listing the materials required for various plaster bases.

**44** PUMPS—Allen-Sherman-Hoff Co. has published Catalog No. 481, "Hydroseal Pumps," describing and illustrating the sand pump, dredge pump and slurry pump. Many diagrams and complete specifications are included in the bulletin.

**45** STACKERS — Lewis-Shepard Products, Inc. has published bulletin No. 28, describing and illustrating equipment for vertical movement in both storage and production operations. Specifications cover the company's line of stackers, hoisters, portable cranes, and working height lifters.

**46** SULFUR SHORTAGE — The Dorr Co. has announced the publication of Bulletin No. 7800, "FluoSolids Roasting of Sulphides." It covers briefly the use of the Dorrco FluoSolids System as an economical means of producing $SO_2$ from pyrite or phyrrhotite to supplement presently short supplies of sulfur. As described in the leaflet, FluoSolids is a distinct departure from conventional roasters. The system has been used to make lime at the New England Lime Co.

**47** TRACTOR REPAIR — Stulz-Sickles Co. has released a booklet describing methods for making repairs on worn tractor parts, with Manganal applicator bars and welding electrodes. Complete specifications and diagrams are shown.

**48** VALVES — Ledeen Manufacturing Co. has published Bulletin 512, illustrating and describing its line of valve actuators, designed for the operation of gate valves, plug valves, dampers, diaphragm valves, butterfly valves and sluice gates. The bulletin shows typical valve actuator circuits, capacities and details of construction, application and control.

**49** WELDING—The Champion Rivet Co. has published a booklet entitled "How to Choose and Use the Correct Electrode." Descriptions are given for using the right electrodes for various applications.

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## C.M.P. Regulation 5

CONTROLLED MATERIALS PLAN Regulation 5, which the National Production Authority put into effect July 6, 1951, replaces N.P.A. Regulation 4, which has functioned for several months in the procurement of M.R.O. items and minor capital additions. This revocation of Regulation 4 means that DO-97 ratings can no longer be used in obtaining maintenance, repair and operating supplies.

C.M.P. Regulation 5 is similar to Regulation 4, but there are two major differences. The use of symbol MRO is to be used instead of DO-97 for obtaining supplies of controlled materials for maintenance, repair and operating supplies, as well as minor capital additions. For products other than controlled materials, delivery orders may be rated by use of the symbol DO-MRO. Delivery of this latter type should be certified by use of the phrase "certified under C.M.P. Regulation No. 5" and signed preferably in the handwriting of the person placing the order.

The other major change between C.M.P. Regulation 5 and Regulation 4 is that producers of Class "A" and Class "B" products who receive orders which are rated with the symbols MRO or DO-MRO, shall not extend such ratings, but shall obtain their production materials as provided in Regulations C.M.P. 1 and 3.

Section 1 repeats many provisions of Regulation 4. There are quarterly quotas for M.R.O., and there is no limit on the quantity of materials and products which may be obtained, providing the priority procedures in C.M.P. Regulation 5 have not been used; or if the MRO and DO-MRO ratings are not used for more than 20 percent of the quarterly quota, there are no quantity restrictions in the purchase of MRO items and minor capital additions. If the allotment symbols and ratings are used for more than 20 percent of the quarterly purchases for M.R.O. items and minor capital additions, quantity restrictions of C.M.P. Regulation 5 are applicable.

If a company operates more than one plant, division, department, branch or other unit, and has maintained separate records showing M.R.O. expenditures, it is permissible to treat any one or more of such units separately, or the entire operation may be combined into a single unit for the establishment of quarterly quotas. Once an election between choices has been made, it cannot be changed without N.P.A. approval.

Under Section 2 (h), it states that the procedures of C.M.P. Regulation 5 may not be used to obtain materials for construction of a type which requires authorization under N.P.A. Order M-4, unless the authorization to build provides for allotment of the necessary materials.

Other provisions included in C.M.P. Regulation 5 are:

1. If purchase orders using the

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DO-97 rating under Regulation 4 have already been placed (whether or not involving the use of controlled materials) for delivery in the third quarter, such purchase orders do not have to be re-rated.

2. If purchase orders using the DO-97 rating for delivery in the fourth quarter have already been placed, such a purchase order must be re-rated, using the rating assitance provided in C.M.P. Regulation 5.

3. The allotment symbol MRO and the rating DO-MRO may not be applied to obtain, in any quarter, minor capital additions which exceed in the aggregate 10 percent of the quarterly M.R.O. quota, or $750, whichever is greater.

4. All MRO expenditures, whether or not the allotment symbols MRO or DO-MRO rating have been used, must be charged against the established quota each quarter.

## C.M.P. Regulation 6

C.M.P. REGULATION 6, construction under the Controlled Materials Plan, issued by the National Production Authority June 21, 1951, sets forth procedures to be followed in applying for controlled materials and "A" products. An "A" product is defined as one containing steel, copper or aluminum, fabricated or assembled to the specifications of a particular customer, beyond the primary forms listed in Schedule 1 of C.M.P. Regulation 1. "B" products and other materials needed for approved construction may be obtained by use of priority rating which will be assigned to projects for which allotments of controlled materials are made. Owners and builders may elect to obtain construction materials under C.M.P. procedures, but are not required to do so.

By the terms of Regulation 6, a prime contractor who wishes to undertake construction must apply when required to do so by N.P.A. Order M-4 or, as prescribed, to the appropriate government claimant agency or N.P.A. Industry Division (indicated in Schedule A of the instructions for filing CMP-4C), for authorization to commence construction. This application for authority to begin construction may be obtained on the same form with an application for an allotment of controlled materials.

A prime contractor who already has received authorization under M-4 to commence construction, or for construction for which authorization is not required, may apply for an allotment of controlled materials on Form CMP-4C. When a construction schedule has been authorized, the prime contractor will receive an allotment of controlled materials for its completion. He in turn will authorize construction schedules for his sub-contractors and make necessary allotments to them from his own allotment. A prime or sub-contractor who has received an allotment of controlled materials will then authorize production schedules and make allotments to

## Another BAY CITY Shovel helping to rush completion of the New Jersey Turnpike

Contractor Louis J. Zimmerman of Hillside, New Jersey knows that it takes man-sized equipment to stand up under the tough production schedule of a big highway construction job. That's why he put his BAY CITY "65" shovel to work at a borrow pit for the New Jersey Turnpike. Like owners and operators everywhere, contractor Zimmerman knows that BAY CITY shovels are engineered from crawlers to boom point for rugged, heavy-duty operation and lasting service. They give you more power plus the extra weight and stability you need to turn out more work every day. Low operating costs mean bigger profits for you. See the many outstanding BAY CITY features at your nearest dealer or write today for complete information. BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN

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Fast-acting power dipper trip is another exclusive BAY CITY feature available on all shovels. It operates electrically or manually by a control located right where you want it—on top of the swing lever. There's no lost time groping for the trip rope — a time savings, operators report, that accounts for up to 25% more yards daily.

188

# BAY CITY

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producers or others supplying "A" products for use on the approved project. An owner or contractor undertaking a construction project calling for not more than specified minimums of controlled materials is not required to apply for an allotment. A self-allotment procedure is to be issued for such cases. Those not needing to make application for controlled materials are those whose quarterly requirements, including material for Class "A" products, do not exceed the following specified amounts: Industrial plants, factories or facilities permitted by N.P.A. Order M-4:

| | |
|---|---|
| Carbon steel and alloy steel (not to include over 2½ tons of alloy steel) | 25 tons |
| Stainless steel | 0 tons |
| Copper and copper-base alloys | 2500 lb. |
| Aluminum | 500 lb. |

For any other construction permitted by N.P.A. Order M-4:

| | |
|---|---|
| Carbon steel | 2 tons |
| Alloy steel | 0 tons |
| Stainless steel | 0 tons |
| Copper and copper-base alloys | 500 lb. |
| Aluminum | 100 lb. |

If a contractor's requirements for controlled materials or Class "A" products needed to fulfill an authorized construction schedule are increased after he receives his allotment, he may apply for an additional allotment to the person who made the allotment for that schedule; conversely, if a contractor finds that he has been allotted substantially more than he needs, he must return the excess.

Each contractor making or receiving any allotment of controlled materials shall maintain accurate records of all allotments received, of procurement pursuant to all allotments, and of the sub-division of all allotments among his direct sub-contractors and direct secondary consumers.

## Safety Achievement

MARQUETTE CEMENT MANUFACTURING Co.'s Des Moines, Iowa, plant has established a record of three consecutive years without a lost-time accident. More than 1000 safe days have elapsed since the last chargeable accident occurred January 8, 1948.

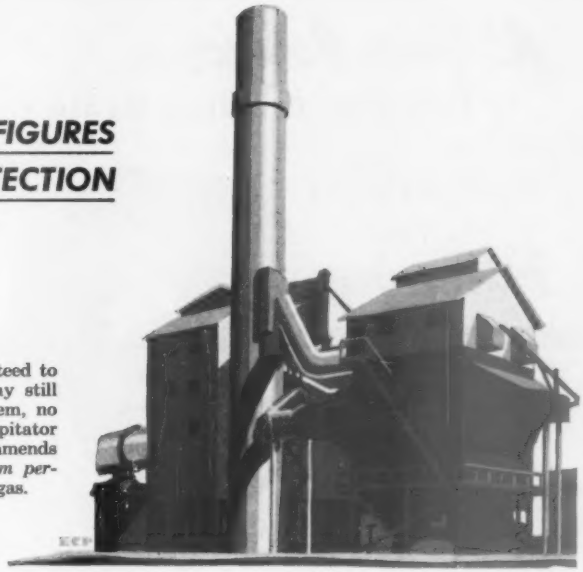
## Year Books

NATIONAL SAND AND GRAVEL ASSOCIATION recently announced the publication of its 1951 Year Book, containing lists of association officers, members of the Board of Directors, and active associate members. It also contains brief references to the work of the association since it was organized more than 35 years ago.

National Ready Mixed Concrete Association has also published its 1951 Year Book, containing lists of association officers, members of the board of directors, and active associate members. There are brief references to the work of the association since it was organized more than 21 years ago. The association has 451 active members and 64 associate members, new high marks in both classifications. There are active members in 45 states, in Hawaii, Puerto Rico, and nine foreign countries.

## HIGH EFFICIENCY FIGURES ARE NO PROTECTION

Unless residual content is guaranteed to meet your specifications, you may still face a nuisance abatement problem, no matter how efficient your precipitator may be. That's why Koppers recommends that you always specify *maximum permissible dust residual* in the clean gas.



# Koppers-Elex Electrostatic Precipitators solve nuisance abatement problems ——*once and for all!*

### HERE'S THE RECORD*

A Koppers-Elex Precipitator installed on a Rotary Rock Dryer was guaranteed to limit stack discharge to 0.2 grain per cubic foot. Based on tests by the customer, the stack discharge is actually less than 0.1 grain per cubic foot . . . well within the present nuisance abatement regulations!

SCORES of plants have found that Koppers-Elex electrostatic precipitators are the permanent solution to nuisance abatement problems. Once the Elex precipitator is installed you are assured of lower dust residuals, a guaranteed degree of cleaning and operation with a minimum of outage time.

Re-entrainment, the big problem in nuisance abatement, is held to an absolute minimum because rapping is sectionalized. Successive collection zones are separately energized to provide maximum voltage in each field for maximum cleaning. You may specify either conventional storage type hoppers or Koppers *unique bottom drag scraper* which gives you continuous dust feed!

Hundreds of Elex precipitators are in use today all over the world. Koppers-Elex electrostatic precipitators are designed, engineered, fabricated and erected under one contract by the Koppers Company . . . and each installation comes complete with Koppers packaged mechanical or vacuum tube power pack. If you have a gas-cleaning problem, write today! Koppers Company, Inc., Precipitator Dept., 278 Scott Street, Baltimore 3, Maryland.

*Guaranteed: Koppers-Elex precipitators are guaranteed to equal or better (under tests made by your own personnel) any efficiency or residual content you specify.

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*Koppers-Elex* ELECTROSTATIC PRECIPITATORS

## Vermiculite Pipe Insulation

ZONOLITE Co., Chicago, Ill., has predicted that heavy consumption of "Z-Crete" underground pipe insulation will continue through the rearming period because no critical materials are required in its production. Also, no transportation difficulties are anticipated because the materials are available at plants in key locations throughout the country.

Z-Crete, a lightweight, resilient concrete insulation for underground heated piping, is made of a specially graded and compounded vermiculite aggregate, portland cement and a liquid waterproofing admixture. It differs from other insulation in that it is a cast-in-place solid covering without joints or voids.

## Measuring Fineness of Cement

NATIONAL BUREAU OF STANDARDS has announced the availability of a new standard fineness sample for the calibration of instruments used in testing portland cements and related materials. The new sample, Portland Cement Standard Fineness Sample No. 114G, is applicable to the Wagner turbidimeter, the Blaine air-permeability fineness meter and the No. 325 sieves. Although the various devices for measuring fineness can generaly be calibrated from the constants of the instruments, the use of standard samples makes the calibration easier and brings the results of tests in different laboratories into closer agreement. Orders for the standard fineness sample should be sent to the National Bureau of Standards, Washington 25, D. C., accompanied by payment in advance. The cost of a 12-gram sample is $2.50. When ordering, both the name and number of the sample should be specified.

## M-4 Order Amended Again

NATIONAL PRODUCTION AUTHORITY has once more amended Order M-4, dealing with construction authorization. Among the changes that have been made is the new Section 3 (j), defining the term "calculated floor area." This should be read in conjunction with Section 17, List C, which deals with residential units requiring N.P.A. authorization. Previously, authorization was required if the cost of the residential unit exceeded $35,000; now authorization is required for a residential unit for single-family occupancy with a calculated floor area in excess of 2500 sq. ft. Another change is in Section 5 (3) which stipulates that industrial construction does not require authorization providing steel requirements are not in excess of 25 tons. Section 5 (f) exempts construction for which a Certificate of Necessity has been issued under the Revenue Act of 1950, or a loan made under the Defense Production Act.

## FINANCIAL

RECENT DIVIDENDS

| | | |
|---|---|---|
| Alpha Portland Cement Co. | $ .50 | Sept. 10 |
| American Rock Wool Corp. | .20 | June 8 |
| Arundel Corp.—Q. | .25 | July 2 |
| Asbestos Corp.—Q. | .50 | June 29 |
| Asbestos Corp.—E. | .25 | June 29 |
| Basic Refractories—Q. | .25 | June 15 |
| Bessemer Limestone & Cement—pf.—Q. | .50 | July 2 |
| Blue Diamond Corp. | .15 | June 22 |
| Calaveras Cement Co. | .25 | June 15 |
| Canada Cement Co., Ltd. 6½% pf.—Q. | .32½ | June 20 |
| Coronet Phosphate Co.—Q. | 1.50 | June 30 |
| Coronet Phosphate Co. | .10 | July 2 |
| General Portland Cement Co. | .50 | June 30 |
| Giant Portland Cement Co. | .12½ | July 1 |
| Hercules Cement (new) | .25 | July 2 |
| Ideal Cement Co. | .50 | June 30 |
| Kelley Island Lime & Transport—Q. | .35 | June 30 |
| Lawrence Portland Cement Co. | .25 | June 23 |
| Lehigh Portland Cement Co. (new) | .30 | June 1 |
| Lone Star Cement Corp. (new) | .35 | June 20 |
| Medusa Portland Cement Co. | .60 | June 30 |
| Missouri Portland Cement Co. | .75 | June 26 |
| National Gypsum Co.—Q. | .35 | July 2 |
| Nazareth Cement Co. | .25 | June 15 |
| Northwestern Portland Cement Co.—pf. | 1.50 | June 20 |
| Pacific Coast Aggregates, Inc. | .08 | June 20 |
| Pacific Portland Cement Co. | .25 | July 25 |
| Peerless Cement Corp. | .25 | Sept. 14 |
| Peerless Cement Corp.—sp. | .12½ | Sept. 14 |
| Penn-Dixie Cement Corp. | .40 | June 15 |
| Penn. Glass Sand Corp.—Q. | .25 | July 1 |
| Penn. Glass Sand Corp.—pf.—Q. | 1.25 | July 1 |
| Permanente Cement Co.—Q. | .30 | July 31 |
| Riverside Cement Co.—cl. A | .50 | July 2 |
| Standard Silica Corp. | .12½ | Aug. 15 |
| Superior Portland Cement Co. | .25 | June 9 |
| U. S. Gypsum Co.—Q. | 1.00 | July 2 |
| U. S. Gypsum Co.—7% pf. Q. | 1.75 | July 2 |
| Warner Co.—Q. | .40 | July 14 |
| Whitehall Cement Mfg. Co. (new) | 1.00 | Sept. 28 |

ALPHA PORTLAND CEMENT CO., Easton, Penn., has reported statement of income for the 12 month periods ended March 31 as follows:

| | 1951 | 1950 |
|---|---|---|
| Net sales | $22,807,904 | $20,168,402 |
| Operating expenses | 13,235,020 | 11,803,118 |
| Maintenance & repairs | 2,536,939 | 2,674,671 |
| Depree. & deplet. | 730,064 | 673,327 |
| Operating profit | 6,305,881 | 5,017,286 |
| Other income, net | 131,137 | 117,173 |
| Total income | 6,437,018 | 5,134,459 |
| Federal income tax | 2,676,502 | 1,981,945 |
| Excess profits tax | 270,000 | |
| Net profit | 3,490,516 | 3,152,514 |
| †Prev. surplus | 7,636,603 | 5,971,757 |
| Dividends | 1,820,443 | 1,487,667 |
| †Surplus, 3-31 | 9,306,676 | 7,636,603 |

†Includes $995,446 capital surplus.

CERTAIN-TEED PRODUCTS CORP., Ardmore, Penn., has reported its account of income for the three months ended March 31, as follows:

| | 1951 | 1950 |
|---|---|---|
| Net sales | $16,379,023 | $10,455,655 |
| Contr. proc. prof. | 100,427 | 92,562 |
| Total | 16,479,450 | 10,548,217 |
| Costs & expenses | 13,556,787 | 8,807,620 |
| Operating profit | 2,922,663 | 1,740,596 |
| Other income, net | 29,252 | 82,428 |
| Total income | 2,951,915 | 1,823,025 |
| Income taxes | 1,614,459 | 737,900 |
| Net profit | 1,337,456 | 1,085,125 |
| Earnings com. share | $0.82 | $0.65 |
| No. of com. shares | 1,623,829 | 1,621,729 |

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has reported income for the years ended March 31 as follows:

| | 1951 | 1950 |
|---|---|---|
| Net sales | $19,175,494 | $18,921,523 |
| Other revenue | 1,437,936 | 1,238,412 |
| Total | 20,613,430 | 20,159,935 |
| Cost of sales, etc. | 12,405,277 | 13,162,749 |
| Selling, etc., exp. | 2,377,045 | 2,333,652 |
| Other expenses | 521,703 | 237,750 |
| Net earnings | 5,309,405 | 4,425,784 |
| Interest | 150,380 | 133,886 |
| Income taxes | 2,317,488 | 1,664,370 |
| Net profit | 2,841,537 | 2,627,528 |
| Earnings pfd. share | $43.72 | $40.06 |
| Earnings com. share | 8.27 | 7.60 |
| No. of pfd. shares | 64,990 | 65,582 |
| No. of com. shares | 320,000 | 320,000 |

LONE STAR CEMENT CORP., New York, N. Y., for the three months ended March 31, has reported the below statement of income:

| | 1951 | 1950 |
|---|---|---|
| Sales | $14,911,353 | $13,252,653 |
| Manufacturing, etc., costs | 8,183,315 | 7,818,646 |
| Selling, etc., expense | 1,210,276 | 1,134,907 |
| Deprec. & deplet. | 569,977 | 509,207 |
| Operating profit | 4,947,785 | 3,789,893 |
| Other income | 159,336 | 128,557 |
| Total income | 5,107,121 | 3,918,450 |
| Foreign exch. res. | 65,000 | 100,000 |
| Misc. deductions | 295,667 | 254,886 |
| Fed. income tax | 1,787,445 | 897,215 |
| Excess profits tax | 350,000 | |
| Other income tax | 431,742 | 330,033 |
| Other taxes | 504,347 | 470,250 |
| Net profit | 1,672,919 | 1,866,066 |

**Quarterly Earnings, per common share ($1):**

| | 1951 | 1950 | 1949 | 1948 | 1947 |
|---|---|---|---|---|---|
| 1st. quar. | 1.76 | 1.97 | 1.67 | 0.96 | 1.24 |
| 2nd quar. | ..... | 3.03 | 2.78 | 2.15 | 1.57 |
| 6 months | ..... | 5.00 | 4.46 | 3.11 | 2.81 |
| 3rd quar. | ..... | 2.81 | 2.90 | 2.40 | 1.97 |
| 9 months | ..... | 7.81 | 7.36 | 5.51 | 4.78 |
| 4th quar. | ..... | 2.76 | 2.98 | 2.67 | 1.90 |
| Year | ..... | 10.57 | 10.34 | 3.18 | 6.68 |

No. of shares 948,597.

NATIONAL GYPSUM CO., Buffalo, N. Y., has reported statement of income for the three month period ending March 31 as follows:

| | 1951 | 1950 |
|---|---|---|
| Net sales | $21,851,209 | $16,378,476 |
| Cost of sales | 14,892,572 | 11,052,285 |
| Selling, etc., expense | 2,021,817 | 1,721,232 |
| †Operating profit | 4,936,820 | 3,604,959 |
| Other income | 63,810 | 33,775 |
| Total income | 5,000,630 | 3,638,734 |
| Interest | 96,677 | 106,150 |
| Doubt. acct. res. | | 44,920 |
| Other deductions | 29,538 | 57,926 |
| Marine operations | *cr* 119,130 | *dr* 67,052 |
| Income taxes | 2,350,000 | 1,310,000 |
| Excess profits tax | 680,000 | |
| Net profit | 1,963,545 | 2,052,686 |
| Earned pfd. share | $19.64 | $23.10 |
| No. of pfd. shares | 100,000 | 88,850 |

†After depreciation, depletion and amortization: 1951, $604,235; 1950, $557,318.

**Quarterly Earnings, per common share ($1):**

| | 1951 | 1950 | 1949 | 1948 | 1947 |
|---|---|---|---|---|---|
| 1st quar. | 0.88 | 0.92 | 0.67 | 0.84 | 0.72 |
| 2nd quar. | ..... | 1.09 | 0.38 | 0.81 | 0.67 |
| 6 months | ..... | 2.01 | 1.05 | 1.49 | 1.39 |
| 3rd quar. | ..... | 1.32 | 0.74 | 0.99 | 0.65 |
| 9 months | ..... | 3.33 | 1.79 | 2.48 | 2.04 |
| 4th quar. | ..... | 0.86 | 0.78 | 1.12 | 0.85 |
| Year | ..... | 4.19 | 2.57 | 3.60 | 2.89 |

No. of shares: 1948-50, 2,112,336; 1947, 1,689,869.

ARUNDEL CORP., Baltimore, Md., reported a net profit of $264,987 for the five months ending May 31, 1951, as against a net profit of $321,820 for the corresponding period of 1950, or $.60 per common share on 438,376 shares in the 1951 period, and $.73 per common share in 1950.

LAWRENCE PORTLAND CEMENT CO., New York, N. Y., lists a net profit for the first quarter of 1951 as $77,993, compared with $46,318 for the same period in 1950. Earnings per common share for the period ending in 1951, were $.35 on 225,000 shares, and $.20 per share for the 1950 period. Net sales for the first quarter of 1951 were $1,293,543, as against $831,149 for the 1950 period.

CALAVERAS CEMENT CO., San Francisco, Calif., has reported net earnings of $217,742 for the three months ending March 31, 1951. Net sales were listed at $1,322,250.

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reported a net profit of $104,410 for the first quarter of 1951, or $.12 per common share on 736,967 shares, and for preferred shares, $8.01 on 13,033 shares. Net sales were listed at $3,979,845.

## MANUFACTURERS NEWS

**Caterpillar Tractor Co.**, Peoria, Ill., has announced the death of Clarence R. Johnson, district representative for the company's western sales division. Mr. Johnson had been with the company since 1927.

**American Brake Shoe Co.**, New York, N. Y., has announced that Thomas E. Akers was elected president, and Maurice N. Trainer was elected chairman of the board of Dominion Brake Shoe Co., Ltd. Kenneth T. Fawcett was appointed vice-president of the American Brakeblok and Kellogg division of the company. Mr. Akers, formerly vice-president of Dominion Brake Shoe, joined American in 1902 as an office boy. Mr. Trainer, president of American Brake Shoe Co., was president of the Canadian subsidiary since 1934. Mr. Fawcett in 1947 was elected vice-president of Dominion Brake Shoe. He will continue to serve in that position and as vice-president of the Brake Shoe Division.

John L. Wilson

**Mack Trucks, Inc.**, New York, N. Y., has elected John L. Wilson a director of the company. Mr. Wilson, vice-president and director of Anheuser - Busch, Inc., was previously with the Mack company for 22 years.

**American Wheelabrator & Equipment Corp.**, Mishawaka, Ind., has reorganized and expanded its sales staff at the executive level. Personnel changes and additions are as follows: L. L. Andrus, vice-president and executive head of the dust and fume division; John A. Silver, director of sales; E. B. Rich, general sales manager; A. E. Lenhard, advertising and sales promotion manager; and S. S. Deputy, sales manager.

**Hammond Bag and Paper Co.**, Wellsburg, W. Va., has announced the election of M. E. Greiner, vice-president and general manager, as a director of the company. Mr. Greiner joined the Hammond organization in 1936 as Western sales representative.

**Air Reduction Sales Co.**, New York, N. Y., a division of Air Reduction Co., Inc., has announced the appointment of Edward H. Roper as manager of the general technical sales department. Mr. Roper joined the company in 1936.

**Cummins Engine Co., Inc.**, Columbus, Ind., has announced a major expansion of engine production capacity, involving new facilities to cost $6,000,000. This is the third major expansion program within the past nine months.

**Olin Industries, Inc.**, East Alton, Ill., has announced that Franklin W.

Olin, 91 years old, died May 21. Mr. Olin started his industrial enterprises with a small powder plant established in 1892 at East Alton. In December, 1944, Olin Industries was formed, and it is now headed by F. W. Olin's son, John M., president, and another son, Spencer T., first vice-president. Franklin W. Olin remained a director of the firm until his death.

**Bemis Bro. Bag Co.**, St. Louis, Mo., has appointed F. V. Deaderick Eastern director of sales, with offices in New York. He formerly was manager of the bag manufacturing plants at Houston. G. M. Robb, former sales manager of the Houston division, succeeds Mr. Deaderick, and C. J. Hurster succeeds Mr. Robb. The new manager of the firm's Chicago general sales division is R. V. Scott who succeeds the late Harvey W. Clements. Mr. Scott moves to Chicago from Buffalo, N. Y., where he was connected with sales promotional work.

**General Electric Co.**, Schenectady, N. Y., has appointed Kenneth S. Watson coordinator of industrial waste treatment for the company. Mr. Watson formerly was assistant director of the Ohio River Valley Water Sanitation Commission.

**The Euclid Road Machinery Co.**, Cleveland, Ohio, has announced with regret the death of Edwin H. Packhurst, former president of the company. He served in that capacity from 1937 until recently when R. Q. Armington was elected to the position. Mr. Packhurst was with Columbia Axle for 22 years, resigning as president in 1937.

**The Hays Corp.**, Michigan City, Ind., has announced the election of T. G. Robinson as chairman of the Gas, Fuels and Combustion section of the Western Society of Engineers. Mr. Robinson is president of Meters and Controls, Inc., representative of The Hays Corp. in the Chicago area.

**Harbison-Walker Refractories Co.**, Pittsburgh, Penn., has established a department of market research, said to be the first of its kind in the refractories industry. William S. DuBois, formerly senior market analyst for the Firestone Tire and Rubber Co., has joined Harbison-Walker to head the department.

**Signode Steel Strapping Co.**, Chicago, Ill., announces that Arvid W. Hamrick, a senior field engineer for the company, has resigned his position to take an appointment with the Commerce Department in Washington, D. C. Mr. Hamrick was named chief of the Steel Strapping Unit, Container and Packaging Division, Chemicals, Rubber and Products Bureau, of the National Production Authority. He spent the war years in the packaging division of the U. S. Navy and the last five years as a field engineer for Signode.

**Nordberg Mfg. Co.**, Milwaukee, Wis., announces the election of B. T. Eagerton, vice-president of its export

division, as charter president of the Milwaukee Trade Club, Inc. He is also vice-chairman of the Foreign Commerce Commission of the Milwaukee Chamber of Commerce.

**John A. Roebling's Sons Co.**, Trenton, N. J., has announced with regret that two Roebling men were killed and another injured in the Pennsylvania Railroad wreck at Bryn Mawr, Penn., on May 18. Those killed were George B. Stoess, assistant sales manager, Wire Ropes Division, and Vincent L. Daulton, Philadelphia District sales manager. Injured was Albert Neroni, advertising manager.

**Yale & Towne Mfg. Co.**, Philadelphia, Penn., has announced two staff appointments at the Philadelphia Division: Norman R. Amberg as assistant works manager, and Harvey W. Wesenberg, supervisor of materials handling. Mr. Amberg was with General Motors Corp. and Mr. Wesenberg is from Hudson Motor Car Co.

**Air Reduction Co., Inc.**, New York, N. Y., has announced the appointment of S. D. Baumer as vice-president of the Airco equipment manufacturing division. Joining this department in 1941 as steel mill specialist, he was appointed assistant manager in 1944 and manager in 1948.

**Nordberg Mfg. Co.**, Milwaukee, Wis., has appointed Houston Engine & Pump Co., Houston, Texas; O'Keefe Motors Inc., Trenton, N. J.; and Midwest Utilities Power Equipment Corp., Chicago, Ill., as distributors for Nordberg 4FS diesel engines.

**Hardinge Co., Inc.**, York, Penn., has announced that Lionel E. Booth is now associated with the company, and will direct the activities of its Salt Lake City office, which is being re-established. Independently of his work for Hardinge, Mr. Booth will continue his former engineering activities and the sale of the Booth flotation machine.

**Caterpillar Tractor Co.**, Peoria, Ill., has been awarded a $22,000,000 order by the U. S. Army Corps of Engineers for three of its larger models of track-type tractors. Bulldozers, cable controls and allied equipment are included in the order.

**The Timken Roller Bearing Co.**, Canton, Ohio, has appointed H. J. Urbach executive engineer of the company. Mr. Urbach came to Timken in 1933 and since has served with the Railroad Engineering Division and the Diesel Pump Division as service engineer. In 1946 he was appointed works engineer for the concern. Also appointed were L. A. Holder as chief mechanical engineer for the company, R. A. Schimpf as chief works engineer and C. M. Maratta as chief consulting engineer.

**General Motors Corp.**, GMC Truck & Coach Division, Pontiac, Mich., has announced the retirement of Harry W. Howard, manager of the division's Pacific region at Oakland, Calif., after 29 years of service. J. W. David, GMC zone manager at Los Angeles, also

retired, after 21 years of continuous service. The Los Angeles and Oakland zones are now merged under F. A. Hoyt, zone manager. Mr. Hoyt will be responsible for activities in California, Arizona and western Nevada.

**The Dow Chemical Co.**, Midland, Mich., has named A. W. Winston, formerly executive assistant, assistant manager of the magnesium department. Mr. Winston has been associated with the Dow company since 1920, for the past 24 years exclusively with magnesium.

**The Lincoln Electric Co.**, Cleveland, Ohio, announces that A. F. Davis, a director, vice-president and secretary of the company, was presented with the degree, Doctor of Science, from Mt. Union College in Alliance, Ohio.

**Brooks Oil Co.**, Cleveland, Ohio, Pittsburgh, Penn., and Hamilton, Ontario, has elected two new vice-presidents. Henry W. Winkler was elected vice-president in charge of research and laboratory control, while Joseph A. Rigby was named vice-president in charge of engineering and sales. Mr. Rigby had been manager of engineering and sales, and Mr. Winkler had been chief chemist for eight years.

**Arkell & Smiths, Canajoharie, N. Y.**, has installed a 5-color press at its Canajoharie plant, marking the completion of a $500,000 expansion program.

**The Rust Engineering Co.**, Pittsburgh, Penn., is the designer-constructor of a new plant at Windham, Ohio, for Harbison-Walker Refractories Co., Pittsburgh, Penn. Plans are also underway for a similar plant at Fairfield, Ala.

**Bemis Bro. Bag Co.**, St. Louis, Mo., has launched a campaign with an advertisement headed "There IS Something YOU Can Do About INFLATION." The advertisement is the first of a series aimed at giving employers an employe communications tool in the fight against inflation and attendant national dangers. It is recommended in the ad that other employers distribute to their employes a 16-page anti-inflation comic book entitled "How Stalin Hopes We Will Destroy America."

**The Hammond Bag and Paper Co.**, Wellsburg, W. Va., has started construction of a multiwall paper bag plant at Pine Bluff, Ark. Expected to be in operation by September 1, this $300,000 plant will replace the company's present Pine Bluff facilities which are being taken over by the Chemical Corps of the Army on that date.

**H. K. Porter Co., Inc.**, Pittsburgh, Penn., has announced that Quaker Rubber Corp., a division of the company, began a quarter million dollar expansion of its hose manufacturing facilities to produce high pressure wire braided hose for the U. S. Air Force.

**The Four Wheel Drive Auto Co.**, Clintonville, Wis., has appointed

Bruce V. Walch manager of the field service department of the company. Mr. Walch formerly was manager of the FWD parts sales department.

**The Heil Co.**, Milwaukee, Wis., has named George W. Mork chief engineer of the company. He will serve as an assistant to Arnold F. Meyer, vice-president in charge of engineering. Mr. Mork has been chief engineer of the tractor equipment division of the Bucyrus-Erie Co. for the last 13 years.

**Baldwin-Lima-Hamilton Corp.**, Eddystone, Penn., has announced that the dump car, trail car and general car business of the Austin-Western Co., Aurora, Ill., has been transferred to and is being operated by Baldwin-Lima-Hamilton. Jess Mossgrove, manager of the car department at Austin-Western, has remained in charge of that department after the move.

**General Electric Co.**, Schenectady, N. Y., has appointed A. F. Vinson manager of employe and community relations of the company's small apparatus divisions, with headquarters at Lynn, Mass. He was formerly manager of the welding divisions at Fitchburg, Mass.

**Goodyear Tire & Rubber Co.**, Akron, Ohio, has announced the appointment of Richard W. Sabine as manager of distributor sales in the company's mechanical goods division, succeeding W. T. Bell, who died recently. Mr. Sabine formerly was senior staffman in charge of mechanical goods advertising and sales promotion.

**Worthington Pump and Machinery Corp.**, Harrison, N. J., has reported that L. M. Evans has been put in charge of its new Rochester, N. Y., branch office. Mr. Evans has served the company as an assistant test engineer and general line estimator and representative in St. Louis, Mo., and Buffalo and Syracuse, N. Y.

**Mack Trucks, Inc.**, New York, N. Y., has signed an agreement with the Wooldridge Mfg. Co., Sunnyvale, Calif., whereby the Wooldridge company will partially produce and fully assemble Mack off-highway vehicles in its Sunnyvale plant. The vehicles will be specially designed to fit the needs of western contractors, miners and loggers.

**Frank G. Hough Co.**, Libertyville, Ill., recently celebrated the opening of its new plant and office building where the entire Payloader line of equipment was on display, including several units announced for 1951 production. More than 200 distributors were present.

**Austin-Western Co.**, Aurora, Ill., announces that the assets and business of Austin-Western Co. have become a part of the Baldwin-Lima-Hamilton Corp., Lima, Ohio. McClure Kelley, president, states that the present management and personnel of Austin-Western will remain the same, and will continue to direct manufacturing, sales and engineering operations.

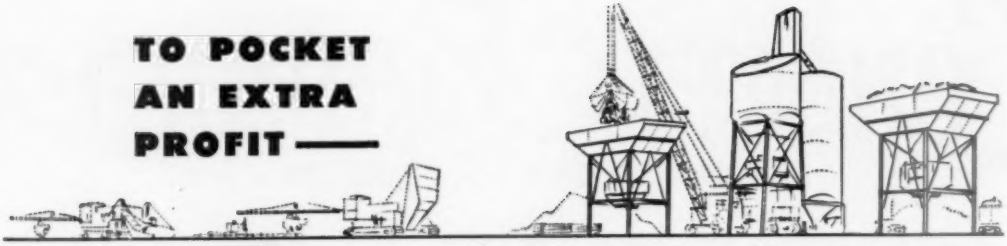
# CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

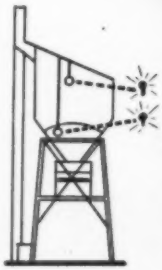

New central mixing plant of J. P. Loomis Coal & Supply Co., Akron, Ohio

**TO POCKET AN EXTRA PROFIT——**

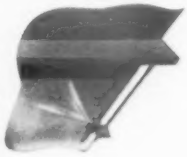


## EQUIP YOUR PLANT FOR TOP PRODUCTION!

LITTLE THINGS can count up big in the profit column. Little things that keep your batchers running smoothly hour after hour — day after day; little things that save in costly, critical manpower.



*As examples:*



**BUTLER Positive BIN LEVEL INDICATORS.** They'll fit any make of plant; work with virtually any material. Sealed against moisture or dust. Practically indestructible yet sensitive as a violin. And absolutely POSITIVE in action.

**BUTLER AIR JETS**

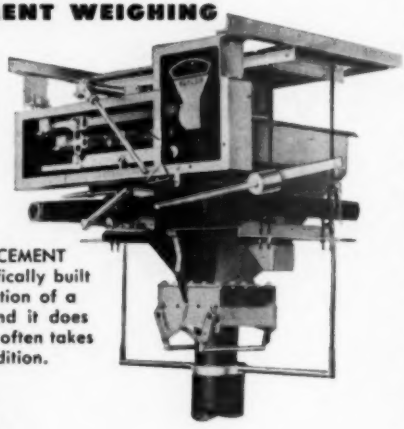
Instant-acting, trouble-free, positive and durable. Worth their weight in diamonds when cement gets obstinate. Install them and activate them with the —

**BUTLER CEMENT AERATOR**

Nothing else like it. So compact it takes only the space of a standing man. Yet, everything's there — compressor, tank, motor and all controls — all in one neat package. There's a dual pressure take-off so you can use air for other applications. Flat tires, for instance.

**BUTLER CEMENT WEIGHING BATCHERS**

We hope you haven't—but if you have a bulk cement bin made by someone other than BUTLER you can still get the advantage of quick accurate batching by installing a BUTLER CEMENT BATCHER. It's specifically built to match the production of a dual drum paver and it does it so superbly that it often takes care of a 27E in addition.



**BUTLER ELECTRIC VIBRATOR**

A highly practical traffic-cop to keep cement from loafing in the batcher. And as a signal to your truck driver that the batch is complete it sends him off to a quick start, too.

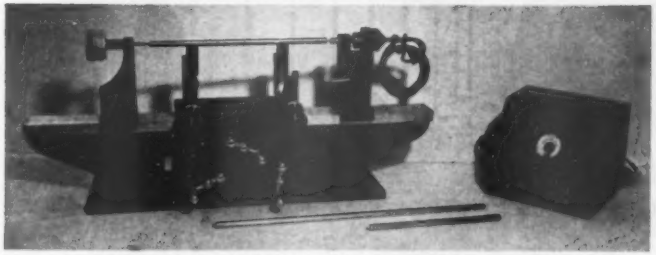
***Any of these you want more information on? Just a postcard will get our prompt attention.***

Want to look over the best in Bulk Cement Plants? Ask for Bulletin 210. It's FREE!

**BUTLER BIN CO.**

**989 BLACKSTONE** **WAUKESHA, WIS.**

# INDUSTRY NEWS



Test device with electronic micrometer

## Device for Measuring Concrete Specimens

THE WATERWAYS EXPERIMENT STATION of the Corps of Engineers, U. S. Army, has developed a modified length-change comparator for use in studies of concrete specimens. The recently incorporated modifications include the substitution of an electrical contact indicator in place of the dial gauge which was formerly used as one of the measuring devices. The modified comparator permits the detection of changes of as little as 0.0001 in. in the length of a concrete specimen and can be used with either cylindrical or prismatic specimens of any dimensions up to 10 in. in diameter and 24 in. long.

## New A.C.I. Building Code

AMERICAN CONCRETE INSTITUTE, at its 47th annual convention last February, adopted new building code requirements for reinforced concrete, which were later ratified by letter ballot.

The new code decreases the allowable bond stress in plain bars (including the old type of deformed bars) and increases the allowable bond stresses for the new-type bar. The code also covers the proper design and construction of reinforced concrete buildings. Price of the new code, "Building Code Requirements for Reinforced Concrete (ACI 318-51)," is $.50 per copy.

## Masonry Promotion

NATIONAL CONCRETE MASONRY ASSOCIATION recently announced the publication of a 4-page folder, a reprint from an insert in the newly released "Producers' Council Technical Bulletin No. 60." This insert lists the names and locations of all producers of concrete masonry who were members of N.C.M.A. at the time the bulletin was printed.

The technical bulletin has proved to be a very successful project, as many architects use them as a ready reference to manufacturers of building materials. It contains postcard listings by which means an architect can request literature from the various firms represented. It was reported recently that over 1300 requests had already been filled at the N.C.M.A. office as a result of the listings and that cards are still coming in at a great rate.

## Organize to Improve Concrete

THE CONCRETE INDUSTRY BOARD, a new organization supported by associations and individual firms interested in every aspect of reinforced concrete construction, has been established in New York City. The purpose of the organization is to improve the quality of all types of concrete construction through education and the "pressure of industry opinion."

The Cement League, affiliated with the Building Trades Employers' Association, was the main force inaugurating the organization. Roger H. Corbetta, former president of The Cement League, has been elected the first chairman of the organization. Eight other directors are being designated by groups affiliated with the Concrete Industry Board. The organizations are: American Concrete Institute; American Institute of Architects (New York Chapter); American Society of Civil Engineers (Metropolitan Section); Concrete Reinforcing Steel Institute; Structural Engineers Society; portland cement manufacturers; testing laboratories and ready-mixed concrete producers. John F. Hall, Portland Cement Association, has been elected secretary; and Dugald J. Cameron, Fireproof Products Co., representing the Concrete Reinforcing Steel Institute, has been named treasurer.

## Big Concrete Pipe

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, recently produced what was said to be the world's largest flat-base concrete pipe, big enough to accommodate a full-sized automobile. The pipe are to be used as a cattle pass and flash-flood conduit under Highway 16, near Coshocton, Ohio. Twenty sections of pipe were used, each section weighing eight and one-half tons, 4 ft. in length, 97 in. high, and 97 in. wide at the base.

STEVA STONE CO., Richmond, Mo., has expanded its plant facilities by the addition of a ready-mixed concrete plant, a 125-ton storage bin, a fertilizer mixing plant, four new fertilizer trucks, and a concrete mixing truck.

ACE SAND AND GRAVEL CO., Spokane, Washington, has been sold to Loyd J. Borjessan who is adding a $25,000 batching plant to the concrete mixing facilities. Ace Sand and Gravel Co. was incorporated in September, 1949. Its assets include sand and gravel, quarries, crushing and screening plant, concrete mixing plant and a fleet of trucks.

KATTERJOHN CONCRETE PRODUCTS CO., Paducah, Ky., recently held "ground-breaking" ceremonies which marked the beginning of construction of a $250,000 plant at North Little Rock, Ky. George W. Katterjohn, head of the company and past-president of the N.C.M.A., Curtis A. Rogers, contractor who is building the plant, Mayor Lawhon and A. C. Perry, Chamber of Commerce president, participated in the ceremonies.

A READY-MIXED CONCRETE plant and five retail lumber yards owned by Daniels Lumber Co., Kansas City, Mo., have been acquired by Long-Bell Lumber Co., Kansas City, Mo. The concrete plant is located in Moberly, Mo., and the yards are at Boonville, Columbia, Marshall, Moberly and Richmond, Mo. With the new acquisitions, Long-Bell now operates 116 retail yards and six concrete plants.

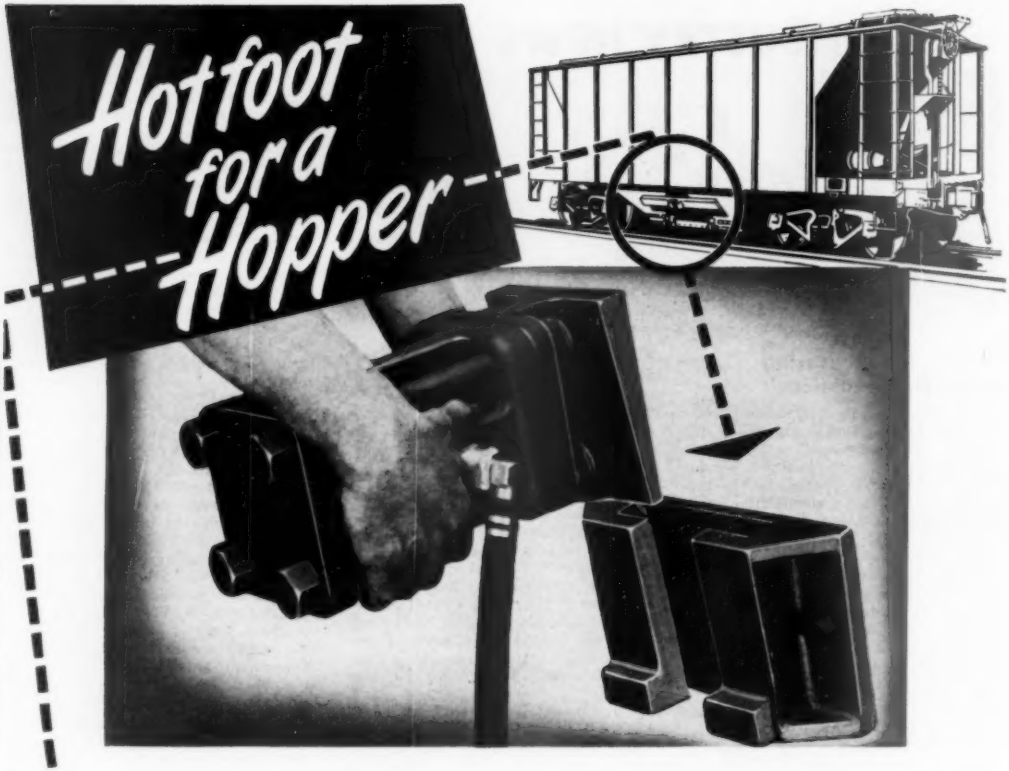
RUBY GRAVEL CO., San Marcos, Tex., has been sold to J. D. Cummings and will be operated under the name of Green Valley Gravel Co. It will supply ready-mixed concrete in addition to washed sand and gravel.

DOLAN CEMENT PRODUCTS CO., Urbana, Ill., recently completed its rebuilding and remodeling project which was started after the plant was damaged by fire last October. The company has added a new line to its concrete block business—the production of precast, reinforced concrete steps which are produced in several sizes. The company will be distributor for the products in Champaign, Vermilion, Edgar, Douglas, Coles and parts of Ford and Iroquois counties, all in Illinois.

A. J. SHERWOOD CONSTRUCTION CO., Bartlesville, Okla., recently began operations at its crushed stone plant which is equipped to process 500 tons of material per day. The company will also do driveway, parking lot and highway construction. Tom Kink is plant manager.

TEXAS LIGHTWEIGHT AGGREGATE CO., Dallas, Texas, recently offered 19,000 shares of common stock for sale, of which 12,599 shares were offered at $14 per share to present stockholders. The remainder were offered to the public at $15.50 per share. The purpose of the sale was to enable the company to purchase the operating assets and inventories of Thomas Concrete Pipe Co., of Corpus Christi.

# Hotfoot for a Hopper



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● New York City Housing Authority plans and builds with a single objective—full value for every dollar—using reinforced concrete frame construction for utmost stability and fire-safety, maximum speed and economy.

General Contractor planned the 12 buildings in Section 2 of Astoria Houses to go up at the same time, but, due to unforeseen foundation conditions, went ahead with six buildings, using 'INCOR' 24-HOUR CEMENT with one set of forms for each building, then re-used these forms on the other six.

Well-engineered forms, designed in the office and built to closest tolerances, were a key factor in streamlined efficiency—erection speed equal to or exceeding that of any other type of frame erection.

First floor poured June 19, 1950 . . . last roof slab of twelfth building on November 1, 1950 . . . *80 floors and 12 roof slabs, 15,000 cu. yds. of concrete, in 98 working days . . . completed before cold weather!*

Dependable 'Incor' early stripping strength kept the job on rapid schedule, saved over 60 days. Result, $1.44 NET saving per cu. yd., over and above the 73¢ a yard extra cost of 'Incor'. Cold-weather saving was another big plus.

'Incor' economy knows no season. Right around the calendar, 'Incor'* promotes smooth-running, time-saving efficiency on which today's close-margin profits depend. One reason why so many Ready Mix Operators make 'Incor' concrete available as part of their good service.

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 17 MODERN MILLS, 125,000,000 SACKS ANNUAL CAPACITY

Plant is gravity-fed. Here cement is being put in bin

**New plant of The J. P. Loomis Coal & Supply Co. has electrical equipment to control all operations in production of uniform concrete**

# PACKAGED CENTRAL MIXING PLANT

A NEW CENTRAL-MIXING concrete plant, with many new features of design for automatic operation and quality control, was opened officially for inspection on June 7 and 8 by The J. P. Loomis Coal and Supply Co., Akron, Ohio. More than 300 were guests of the company on those days, numbering among them architects, contractors, engineers, city officials, cement men and officials of financial institutions.

Refreshments were served throughout the two days and the guests were escorted through the new plant in small groups in order that the control features in their relation to uniform, high quality concrete could be explained in detail. Regular showings were made of a colored movie entitled "Concrete in Akron" which showed the production of concrete and many job applications. The new plant is shown on the cover of this issue of CONCRETE PRODUCTS.

**By BROR NORDBERG**

The J. P. Loomis Coal and Supply Co. has been in the building supply business for 32 years and, since 1938, has been active in the production of transit-mixed concrete proportioned from a dry-batch plant. Its new central-mixing plant is the first such operation in Akron and was selected, in preference to transix-mix, because company officials visualize an expanding market for concrete which must be developed upon the basis of making available the most uniform concrete attainable. By producing a high-grade product of uniform properties as delivered in each truck delivery unit, it is anticipated that there will be greater customer acceptance for concrete.

In order to accomplish this, it was desired to eliminate the human factor as much as practicable both in the plant and in the delivery of concrete. Accordingly, a plant and equipment were selected on the basis of automatic controls available to eliminate variables in batching. One of the objectives is to be in position to educate users of concrete to specify a product according to definite strength and slump.

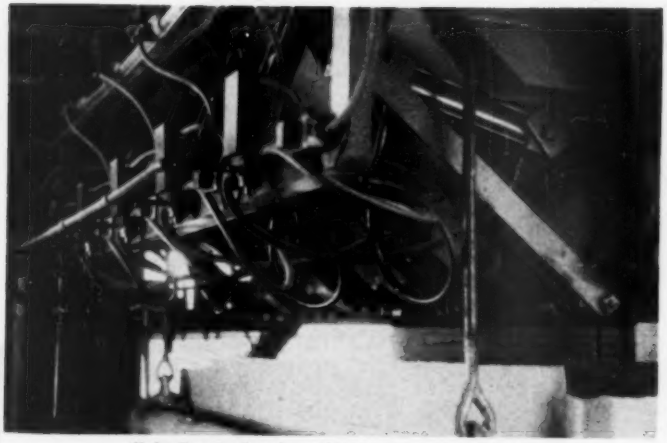
## Plant Design

The new plant has a 3½-cu. yd. mixer and a capacity of 1000 cu. yd. of concrete per day. It is a Supremix packaged plant designed and manufactured by Supremix, Inc., which is affiliated with the Gene Olsen Corp., manufacturer of concrete products machinery.

Location of the plant is in an exhausted sand and gravel pit directly across from the main office of the company on Home Ave., which permitted full use of the difference in elevation between the street level and

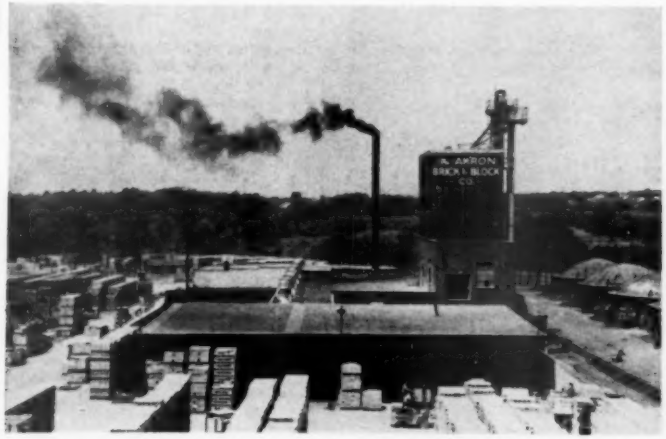
Foster Cunningham, operator, demonstrates batching controls

Here, Foster Cunningham operates hydraulic discharge of mixer



Hydraulic gates for release of aggregates into weigh batcher

Very complete facilities were built for washing out trucks and keeping them clean




Modern block plant is part of Loomis' diversified operations

the pit floor in designing a gravity-fed plant.

Both cement and aggregates are charged directly into the plant bins and there are no cranes, elevators or conveyors required. Aggregates are delivered by trucks which back out over a short ramp to dump into any of the five compartments of the aggregate bin. The bin holds 450 tons. Cement is delivered by either pneumatic or screw-type bulk cement trucks which travel the same ramp and discharge directly through hatches into either of the two compartments of the 800-bbl. cement bin.

## Factors in Plant Design

Aside from the efficiency of a gravity-fed plant, there were local considerations that dictated the layout selected. Aggregates are delivered into Akron almost entirely by trucks, and different aggregates are specified by various purchasers. It is necessary to have facilities for gravel, crushed stone and slag coarse aggregates in addition to sand, and there are various grades of these several aggregates that must be provided.

For example, No. 4 coarse aggregate (minus ¾ in.) is specified in either crushed stone, crushed gravel or slag. Other commonly used products are No. 6 gravel (⅜-5/16 in.), No. 6 crushed stone (½-¼ in.) and either No. 3 slag or gravel (1½-⅜ in.).

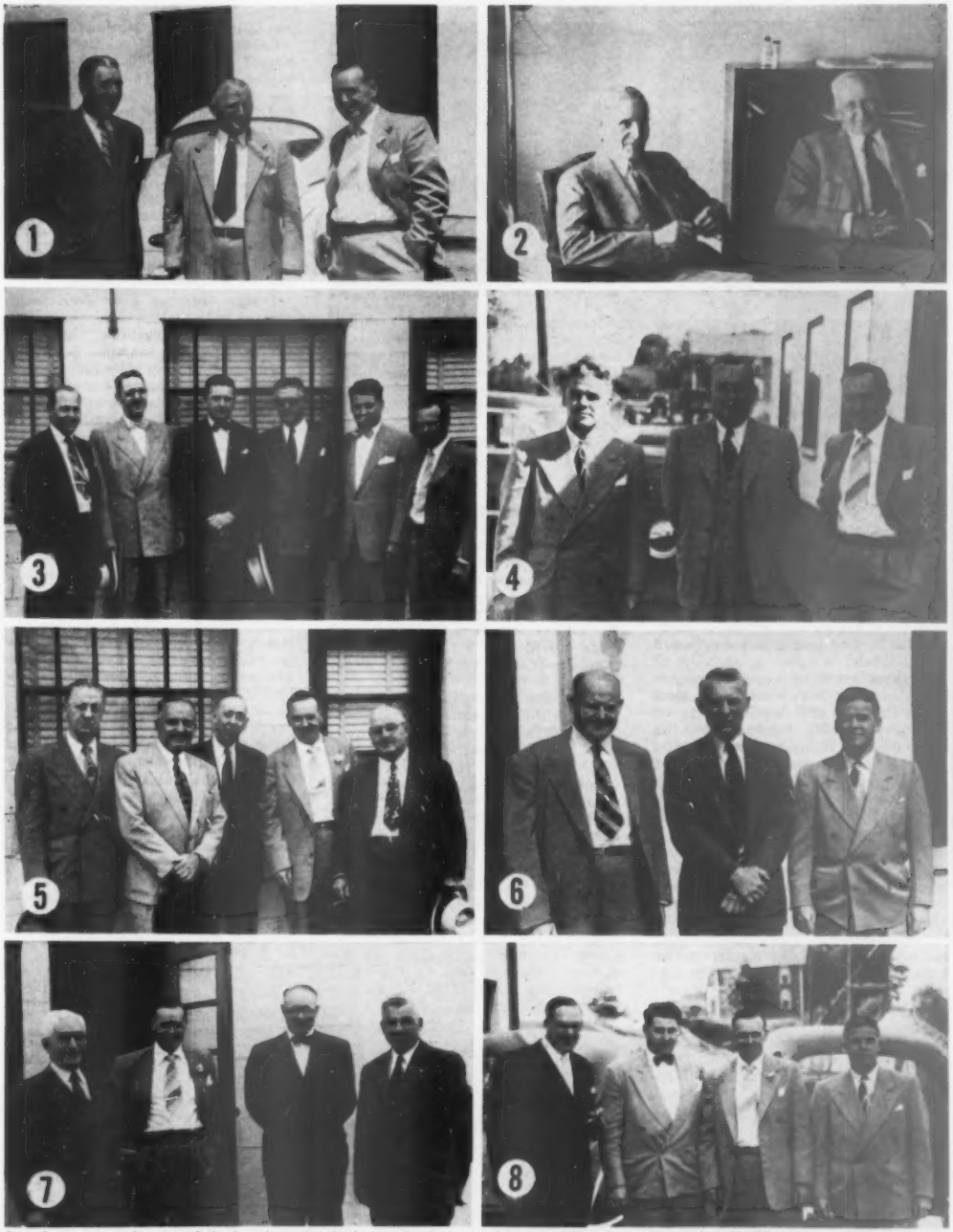
With these multiple requirements in aggregates it is a great advantage to have direct-dumping into overhead bins rather than have trucks hauling these various products into a plant where they must be elevated separately and handled into their respective bins.

The field dispatcher's office is in a concrete masonry building directly under the ramp, which also houses the boiler room and concrete testing facilities. Located under the cement storage portion of the bin is the operator's platform, immediately adjacent to and on the same level with the dispatcher's office. The dispatcher is in a position where he can see incoming concrete delivery trucks, write out the delivery ticket, hand a copy to the mixer operator and drop the other copies through a chute where they are picked up by the driver while his truck is being loaded.

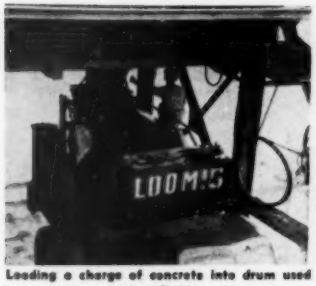
One of the more interesting features of the plant is that the mixer operator's platform is located in front of the discharge end of the mixer where he can see into the mixer and observe the action. All the controls are centralized for the convenience of the operator including the electric control panel, the loading scale, the water meter and the mixer controls.

## Mixer

The mixer, designated as a 3-cu. yd. Supremix tilter, is bolted directly on to two of the columns which help support the bin, and is powered by a 40-hp. totally-enclosed electric motor. Tilting of the mixer is done by two




**Open house on opening day of the Loomis ready-mixed concrete plant brought many visitors to see the modern facilities. Among them were those shown here (all left to right). (1) Mayor Charles E. Slusser of Akron; M. L. Davis, service director, Akron; C. F. Shoaff, The J. P. Loomis Coal & Supply Co. (2) President L. W. Camp, The J. P. Loomis Coal & Supply Co., chatting with customer W. E. Leahy, McCourt Construction Co. (3) Gene Olsen, Jr., Gene Olsen Corp.; M. Harpold, P. Rutherford and C. Brundage, Bessemer Limestone & Cement Co.; Mel Myers, Supremix, Inc.; and W. Hagenlocker, Portland Cement Association. (4) R. W. Collins, general superintendent, The J. P. Loomis Coal & Supply Co.; A. W. Wood, The Cleveland Slag Co.; and C. F. Shoaff. (5) E. Jackson, L. Mentzer and C. Elwell, First National Bank, Akron; C. F. Shoaff; and H. H. Camp, Camp Bros. Co., Magadore, Ohio. (6) L. Hoffman and L. W. Bausher, Akron Water Works Department, and R. W. Collins. (7) J. Horrigan, Carmichael Construction Co.; C. F. Shoaff; J. Roam and H. H. Enciehart, both of Carmichael Construction Co. (8) R. L. Taylor, sales manager of Loomis; Mel Myers, C. F. Shoaff and Bob Collins**




Loading a charge of concrete into drum used as agitator

Here is stationary perlite expanding furnace

Airslide transfers cement into batcher

hydraulic cylinders. It is pivoted near the discharge end so that, in discharging, the charging end moves up while the discharging end moves downward only slightly.

This design feature enabled mounting the mixer somewhat lower than ordinary while still leaving 12 ft. of clearance for the trucks under the loading spout. In discharging concrete, there is almost vertical passage of the concrete into a drum-type truck mixer. The mixer has eight blades and, with the drum interior, are hard faced.

## Batching

Cement is transferred to the cement weigh batcher from either of the overhead compartments by Fuller-Huron airslide. Through a lever system the cement batcher is connected to a dial scale on the operator's platform. The gate at the discharge end of the airslide is controlled by two hydraulic cylinders operated through solenoid valves from the control panel and the scales so as to open by push button and be held in the full open position until all but the last 100 lb., approximately, of the predetermined weight of cement is reached. The gate then partially closes to effect a dribble feed of the remainder, completely closing automatically when the full weight of cement is reached.

Aggregates are weighed into the aggregate batcher through a system of hydraulically-operated gates controlled from the control panel and the scales through solenoid valves. The gates are opened by push button and closed by the scales. They are arranged in pairs, two to each of the five bin compartments. These pairs operate together as a unit to get fast charging with a minimum of segregation.

Both the aggregate and cement scales, while separate in action, are contained in a single unit. Full dials show the weight in the weigh hoppers as they are filled. In addition to automatic cut-off the aggregate scales compensate for moisture content in the aggregates. A gravimeter scale calibrated to show the percentage of free moisture is used for daily moisture content tests.

Darex air-entraining agent is added to all the concrete as processed and the required amount for a batch is dispensed automatically through a dispenser operated by a timer on the control panel. A light on the panel actuated by the flow of Darex into the batch is insurance against mechanical failure or starvation of feed.

Calcium chloride solution is dispensed through a similar unit for winter operation. The timer controlling this is also in the control panel and includes a flow light. Darex and calcium chloride solutions are stored in the boiler room where the pumps are located which keep the dispensers filled.

Water enters the batch through a 2-in. Neptune meter with automatic shut-off. Hot water plus steam jets in the aggregate bin are provided to maintain concrete at approximately 70 deg. F. for winter operation.

Design features have been incorporated in this plant to minimize common operating difficulties. The aggregate batcher, for example, is streamlined and has steep sides and rounded corners to facilitate complete discharge without the use of vibrators. Aggregates are fed directly into the mixer and no collecting hopper is required. Cement is ribbon-fed along with the aggregate.

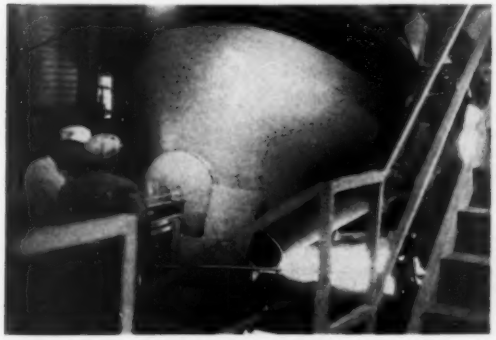
If desired, which would be only in event of emergency, the aggregate and cement could be batched directly into mixer truck bodies for mixing in transit. The mixer would then be tilted out of the way and the material discharged into a diversion chute leading to a separate line of traffic through which mixer trucks would operate. Power for operation of all the controls is supplied by a hydraulic pump and accumulator unit driven by a 7½-hp. electric motor. One man operates the plant.

Concrete is delivered in a fleet of 15 drum-type mixers, both of Rex and Jaeger manufacture, mounted on International chasses, which have capacities of 3- and 4-cu. yd. as agitators; and, in addition by four 4-cu. yd. Aircreter non-agitating units. All concrete produced is air-entrained and the drum-type units are generally used for all the longer hauls. However, the dump-body units have been used for hauls up to 16 miles. Loomis has recently set up a dry batch plant in nearby Kent, Ohio.

## Diversification

The company is a large dealer in

(Continued on page 238)



Mixer is in tilted position here

Mixer in charging position; cover at lower left is closed to minimize dust

**North Hollywood Concrete Tile Co. stresses 4-in. high units in building large volume of sales**


A. Richard Clanton, left, and his two sons, Raymond W. and Hollis L. Clanton, operate North Hollywood Concrete Tile Co.

# HIGH CAPACITY SINGLE-UNIT PLANT

FROM AN "ALSO RAN" to one of Southern California's leading producers of concrete masonry units in less than two years is the record of the North Hollywood Concrete Tile Co., 12323 Sherman Way, North Hollywood, Calif. Its present success is due in a large measure to the foresight and careful planning of Richard Clanton, who started North Hollywood Concrete Tile Co. in 1944 with 18 years of concrete block production already behind him.

The present company had a very modest beginning. Not satisfied with the equipment then available to the smaller block manufacturers, Mr. Clanton designed and built his own block machine. With the able assistance of his son, Hollis, a man to operate the mixer and a yard man, this home-made machine, in spite of its limited production capacity, carried them through their first five years in the block business.

The close of the last war brought a terrific demand for concrete masonry throughout the Southwest. Gradually the company's original equipment fell behind in its ability to produce all of the block that could be sold. This was apparent soon after Raymond W. Clanton, a B-29 pilot, returned from the Pacific Theatre of War.

"We were making a good living and were free from debt," said Raymond Clanton, "although we were acutely aware that we were not keeping up with the demand for our products. But when Dad first proposed a new block machine with a greater and more versatile production capacity my brother Hollis and I hesitated to string along with him on account of the pretty big financial obligation we would have to assume to modernize our plant as he proposed."

However, on account of his faith in the future growth of the San Fernando Valley, Richard Clanton persisted in his plans for expansion, and decided to install a block machine that would have large capacity and permit flexibility in making units of various heights.

A Columbia block machine was finally chosen. This was the semi-automatic model known as the No. 8 Columbia, because it will make the 8-, 6- or 4-in. high block, the latter very popular in the Southwest. The machine was delivered in October of 1949. It has run one, two and often three shifts, depending to a large extent upon the availability of cement.

In its first year and a half of operation, it is estimated that this block machine has produced 3,000,000 units of various dimensions, mostly in the 4 in. high series with the exception of an unusual block of their own design that has met with considerable demand for garden walls, backup, some partition walls and for cess-pools. It is a 4- x 8- x 12-in. unit.

After a quarter century in concrete masonry production, Richard Clanton has of course become keenly aware of the demand for all types of masonry units. He has designed special molds for the production of such or-

(Continued on page 240)

A portion of the yard and the aggregate and cement storage bins

View of the steam generator installed at Hudson Builders Material Co., Jersey City, N. J.

**Hudson Builders Material Co. jets live steam into hoppers rather than heating aggregates completely**

# LOW-COST WINTER CONCRETE

By M. D. MORRIS*

SIXTY DEGREE DELIVERED concrete, regardless of the temperature of the day, has been the policy of Hudson Builders Material Co. all last winter —and it has been done, every day.

One afternoon in mid-November Mike Tarantino, maintenance superintendent of Hudson Builders called and said that he had this problem: the plant, at the foot of Howell Street in Jersey City, N. J. had two steam boilers, one, a 100-hp. oil-fired, and the other a 75-hp. coal-fired unit, both the vertical or haystack type. The 100-hp. boiler was being retubed and relined, but the 75 was a total loss. He needed a lot of steam economically. The plant's output for the first hour's run in any morning was twenty truckloads of ready-mixed concrete. Each truck needed 200 gal. of water. This is 4000 gal. of water to be heated in the course of the first hour from the 40 deg. F. in the city's line to at least 160 deg. F., a differential of some 120 deg. F. In addition, there is the matter of breaking ice and chunks in the aggregate, and the demand of a steam-operated National hoist. My job was to survey the plant, consider all possibilities and make a recommendation.

## Steam Generator

I suggested a Littleford Kwik-Steam generator Model 3500-E to be used in conjunction with the reconditioned 100-hp. oil-burning boiler for the present, and the replacement of the latter by a Model 2500-E Kwik-Steamer in the future. This recommendation was reached for the following reasons; the plant essentially is a twin set-up, either section of which is able to function independently, there being only an interconnection of utility lines. The company chose to keep the haystack boiler going all night on cold nights to keep the two 1500-gal. tanks filled at about 60 deg. F. This meant that three-quarters of the 4000 gal. required for the first hour's output would come from this reserve, while the inlet is opened to the constant influx of city water at 40 deg. F. or less so that the tanks will remain filled at all times regardless of drawdown. Maintaining this water supply at 165 deg. F. in the morning was calculated to require 3140 lb. of steam per hour through the heating coils.

## Steam Requirements

The idea of heating sand and aggregate completely was discarded because the quantity of steam required was prohibitive and uneconomical, there being nearly one boiler horsepower at 125 p.s.i. (gauge) required to heat one ton of aggregate (with 5 percent moisture) per hour, from 10 deg. to 35 deg. F. (nearly twice as much steam as necessary for water heating for the same quantity of concrete). The big loss in aggregate heating occurs when the steam warms the air in the interstices which rises by convection and becomes lost to the atmosphere before it can even assist by heating the surfaces of the stone it passes. The recommended method was to jet live steam into the hoppers at great force for short intervals to break up top ice and loosen chunks of frozen aggregate. This blast is repeated periodically as needed, which leaves the steam for heating the water and eliminates the secondary condition of having the condensate from the blast freeze into more ice on the aggregate surface. The jetting is accomplished by running a 1½-in. header up to the operator's level in the batching plant. There eight individual bleeder lines of ½ in. size tap off in two sections of four each, thence


Ready-mixed concrete plant of Hudson Builders Material Co.

*Engineering representative, New York, N. Y.

going two to a side. Each line has its own hand valve for full control of velocity and discharge.

The Model 3500-E Kwik-Steam generator supplies 3500 lb. of steam per hour, enough for the 3140 lb. needed to heat the peak hour's requirement of water with a surplus for the aforementioned aggregate steam jetting. Past the first hour, the requirements diminish, leaving a greater surplus which the management decided to use in radiator coils and space heaters to keep the garages and shops warm.

Since all the daytime heating is accomplished by the Kwik-Steamer, the 100-hp. boiler is used only for operating the 1928 model National hoist and swinger engines on the stiff-leg derrick. At the end of winter operations, the derrick was operated from the steam generator and the boiler shut down entirely. Actually, on three occasions thus far boiler trouble caused this switch as an emergency operation which proved most satisfactory. For the future a Model 2500-E may replace the boiler and run the derrick. That is why the original 3500-E was ordered complete with steam receiver and fabricated baseplate.

The old boiler house was ideal for the Kwik-Steamer. All the lines were cut in and the addition of an oil line and steam outlets was no problem. The hoist and swinger on that end, a Lidgerwood, is similar to the other, but is electrically driven. The plant's current characteristics, 220 volt, 60 cycle, 3 phase, are perfectly suited to operate the 7.5-hp. electric drive motor which operates the fuel and water pumps and the blower fan on the steam generator. Arriving completely assembled and attached to the baseplate, it was a simple job to slide the unit into its spot, replace the door framing and tie it in. The baseplate has since been bolted to the concrete floor. A 12-ft. vertical exhaust stack with umbrella was later added.

### Steam Generator Operation

Since the generator gets up a full 125 p.s.i. head of steam from a cold start in 2 min., there is no need for the operator to come in any earlier than the rest of the crew, a definite saving in overtime man-hours over the entire cold period, and one to which, on cold winter mornings, the operator does not object. Further economy is shown in a study of fuel consumption over a seven-week period: December 27 to February 16. No. 2 diesel oil was used for a total of 7799 gal. in this period, which actually comprised some 400 working hours. Work time is a standard 40 hr., 5 day week, with the exception of the three times the 100-hp. boiler was down, when the Kwik-Steamer did 24 hr. continuous duty besides running the hoist. The Littleford company has rated this unit to consume 40 gal. per hour at maximum output or a theoretical 16,000 gal. Moreover, the unit will only burn fuel when actually producing steam for work. Since from previous figures we note that the demand is almost at peak for a good part of the day, the fact that actual fuel consumption is half the theoretical is a tribute to the efficiency of the steam-fitting and line insulation done by the maintenance force. It should be noted here that one gallon of 1, 2, or 3 diesel oil (the only fuel the generator will burn) in combustion in this unit supplies sufficient heat to make over 90 lb. of steam, this in contrast with any usual type boiler which burns fuel all of every working day in order to maintain its head of steam.

The willingness to step ahead and be the first plant in the area to use a replacement for a conventional boiler is typical of the progressive moves of Hudson Builders' over the years. The dispatcher, Lewis J. Buckshaw, with the firm for 25 years, remembers the innovations from the intercommunication system enabling anyone on the lot to speak to any other location by just pressing a button, down to present efficient bookkeeping methods. This efficiency isn't limited to administration; cement arrives in bulk by covered barge, where a Fuller-Kinyon 100-bbl./hr. cement pump fills the bins and hoppers with any one of the three types of cement stocked.

### Plant Location

The plant is located on the Hackensack river, enabling the sand and aggregate to be brought in by barge as well. These are unloaded and moved about the plant by the two derricks mentioned above. Besides sand, Hudson Builders' stores six types of stone and gravel ranging from 1½ in. to ¼ in. On the dock is storage space for 3000 bbl. of cement and 5000 tons of aggregate which supplies the two batching plants.

John J. Schmitt, secretary and general plant manager, says that the company uses its own mix designs for most of the old and new customers but will batch to any specification. At present about 50 percent of the daily output goes to the New Jersey Turnpike project at several points along the route. Trucks range in about an eight-mile radius. This has been found over the years to be the maximum economical round trip of a truck. The maximum daily output has been 1000 cu. yd.

Headers and bleeders of steam lines used for jetting steam into aggregate bins are at the top; valves are located near operator's station

Maintenance superintendent Mike Tarantino regulating oil pressure on the steam generator

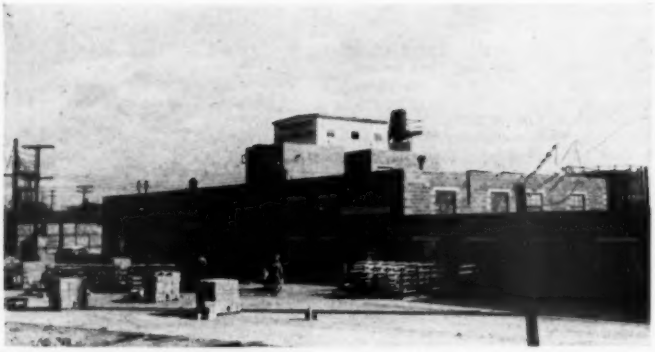
## Ready-Mix Meeting

OHIO READY MIXED CONCRETE ASSOCIATION held its annual meeting, June 19-20, 1951, at the Sheraton-Gibson Hotel, Cincinnati, Ohio.

The program included reports by the officers of the association followed by an address on "A Successful Safety Program," by Ralph H. Anderson, W. E. Anderson Sons Co., Columbus, Ohio. Mr. Anderson's safety program has gained national recognition and has been heartily recommended as a practical approach to improved public relations for the industry.

Walter H. Acheson, head of Masonry Materials Section, Building Materials Branch, Office of Price Stabilization, Washington, D. C., spoke on "Orders and Interpretations of the O.P.S." Mr. Acheson is a past-president of the Wabash Valley Ready Mixed Concrete Association and, up to the time of his appointment in Washington, was a director of the National Ready Mixed Concrete Association. Following the address, Mr. Acheson answered many questions various companies have had concerning O.P.S. regulations, as applied to the industry.

V. P. Ahearn, executive secretary of the National Ready Mixed Concrete Association, brought the industry up to date on many of the controversial subjects pertaining to federal legislation and controls.



Superior Building Units, Inc., plant at Richmond, Va.

**Superior Building Units, Inc., Richmond, Va., has perfected operation of autoclaves**

By WALTER B. LENHART

# HIGH PRESSURE STEAM-CURED UNITS

THE SUBJECT OF expansion and contraction of concrete masonry units in the wall is quite a controversial one. One group that is pressing its investigations is the high pressure steam curing group. Evidence has now been made available that possibly soon may lead to changes in the specifications of concrete masonry units. In essence these will throw out the absorption requirements, and substitute in their stead actual physical measurements of the concrete block under different moisture conditions. Any block that does not come up to the prescribed provisions will not meet the specifications.

Specifications would be similar to those now used by the British concrete manufacturers whereby shrinkages of the block are actually measured from saturation to a certain relative humidity at a given temperature. This appears to be a sound approach which if adopted may have broad repercussions throughout the industry. The dropping of absorption requirements would remove a requirement which to many is silly, for no matter what the water content of a unit is when it leaves the plant this is no criterion of what it is in the wall, unless the builder, at all times, has protected that block from the weather. It is improbable that the average user of a concrete block makes much of an attempt to keep the block under cover during construction.

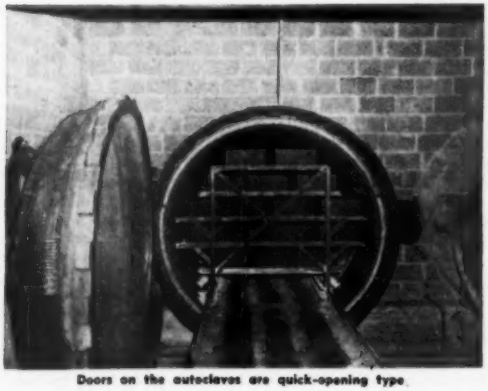
The high pressure steam curing group believes that it is the best answer to the production of a concrete masonry unit with minimum expansion characteristics. If the expansion requirements are put at a low figure it could mean a wider adoption of high pressure steam curing. Because of this possibility we inspected the plant of Superior Building Units, Inc., at Richmond, Va., to re-appraise and review the general subject.

Superior Building Units is a wholly owned subsidiary of Concrete Pipe & Products Co., Inc. of Richmond, Va. The former is referred to as its North Side Plant No. 2 and is located at 1211 School St., Richmond. The parent company has its operations at Belt Boulevard and Petersburg Pike on the south edge of the city. Both plants use Besser equipment and high pressure steam curing.

## Plant Design

The Superior plant was built in 1948 and was acquired by its present owners in February of 1950. At that time the plant had only two high pressure steam curing units so two additional autoclaves were installed during February of 1951. The plant now has four autoclaves that are 6 ft. 6 in. in diameter and 80 ft. long. They are open at one end only and are arranged in a row with the open end facing the front-feed Besser block machine. There is ample room for lift trucks to maneuver in the area between the units and the block machine.

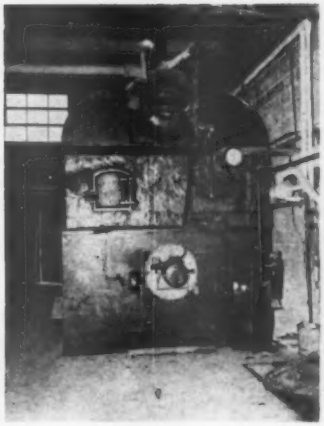
Two objections to high pressure steam curing have been the high in-



Doors on the autoclaves are quick-opening type

Batcher and mixer on machine floor; concrete is delivered by skip to block machine


Trade name for the block, "Paracrete," is advertised on the smoke stack



The 150-hp. boiler with rotary fuel burner supplies 150-p.s.i. steam to the four autoclaves

Crusher in the foreground is for cinders or expanded lightweight aggregate

stallation cost of this type of autoclave and the slightly higher operating (labor) costs, for on the older types of high pressure units it took considerable time to close and open the massive doors on each. However, at the plant of Superior Building Units, both of these objections have been reduced by considerable margins; first, the installation costs were reduced by having the 80-ft. steel drum-like autoclaves made in Richmond, thereby reducing the freight haul, and second, by purchasing the doors from a manufacturer who specializes in this type of equipment. This procedure reduced the installation cost as well as the initial investment.

## Autoclave Doors

The next step was to reduce the labor cost of opening and closing the old type of door, which had to be bolted into place and unbolted after the curing cycle ended, both time consuming operations. The doors used here are the quick-opening type and one man can close or open a door in a few minutes. To do this the door is swung into position against the autoclave and turned a fraction of a turn. Lugs on the door engage corresponding lugs on the face of the autoclave. The operation also tightens the door adequately.

The first two units installed were made by Old Dominion Iron and Steel Corp., Richmond. The last two autoclaves were made by Richmond Engineering Co., Inc. The doors were all supplied by National Erie Corp., Erie, Penn.

The four autoclaves will hold a 10-hr. day production of roughly 7000 standard units. Steam is supplied the units by a 150-hp. Erie boiler that has a type RAH, Todd rotary fuel burner. Oil is used for fuel. Each autoclave is provided with a Manning, Maxwell & Moore recording pyrometer. Curing is carried on for 8 hr. under 150 p.s.i. steam pressure. As the units are well insulated little heat is lost from radiation, so fuel requirements are quite nominal. The aggregate used here is either cinders or Solite from Southern Materials Co. and block made here are said to have roughly one-half the expansion of concrete units made under the best of high (or low) temperature curing conditions.

The general appearance of the plant is quite attractive and has been designed to eliminate costly material handling, yet providing plenty of room for later enlargements. Cinders or Solite are received on the Seaboard railroad and unloaded to a track hopper. A bucket elevator serves the track hopper and unloads to a vibrating screen with the oversize going to a set of rolls. A short belt conveyor delivers to a second set of rolls and back to the boot of the bucket elevator. The fines go to a second bucket elevator, then to a cross belt to the service bins over the weigh batcher. Ground storage is also available for primary aggregates.

One of the sets of rolls is driven by Sterling gearmotors, each roller-chain-connected to a roll on a short center drive. The second set of rolls is similarly driven except that two U. S. Motors drive each roll by V-belt. At the start of operations only one set of rolls was used, but the ratio of reduction was too great and caused excessive strains on the short center drives. This in turn threw the strain on the gears and frame of the geared motor and thereby caused considerable maintenance expense. By putting in two sets of rolls the ratio of reduction requirements were met without excessive strains, providing a system that has worked satisfactorily. The shells are secured locally and when worn are built up with a high carbon electric welding rod. Portland cement is received at the plant in bulk.

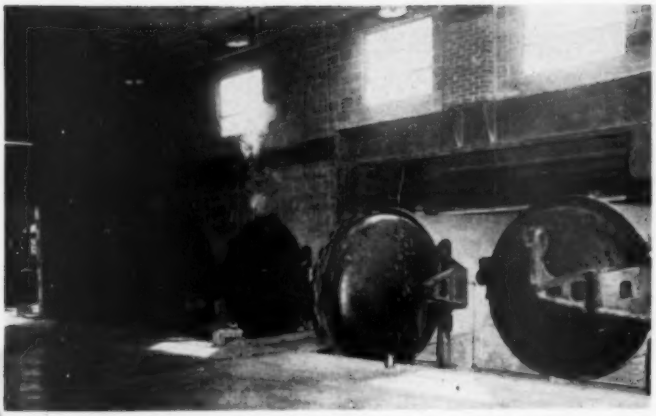
John Guidt, seated, is plant manager, and Charles Heuchens is plant foreman

## Block Machine

The plant uses one Besser front-feed pallet machine and has four platform Automatic Transporters to place the filled racks in the high pressure autoclaves, to remove them and to carry them to the cubing yard. One Yale and Towne fork truck is available for handling the cubed block. The weigh batching equipment, bucket elevators and conveyors were all made by Fanning-Schuett Engineering Co., Philadelphia, Penn. The plant normally employs 14 men.

The batching equipment is elevated somewhat on heavy steel I-beams and is the shuttle-type, so if another block machine is added later the one batcher will suffice for both units. The 50-cu. ft. Besser mixer is placed below floor level and a skip delivers to the hopper over the block machine. The plant building is of concrete block and steel. The yard is completely paved.

The parent company, Concrete Pipe & Products Co., is one of the South's most progressive concrete products manufacturing companies, and besides the block plant with high pres-



These four autoclaves will hold a 10-hr. day production of approximately 7000 standard block

sure steam curing it makes a wide variety of concrete pipe, the larger sizes of which are made on a Hume centrifugal machine. The company recently put its new Spectra-Glaze plant into operation. This is a plastic-faced structural unit that has many architectural advantages. Spectra-Glaze is a development of Burns & Russell Co., Baltimore, Md. (See ROCK PRODUCTS, June, 1951, page 182, for a description of the Spectra-Glaze process).

### Personnel

Superior Building Units, Inc., and the parent company, Concrete Pipe & Products Co., Inc., both market their concrete block under the trade name of "Paracrete." Stanley Navas is president and sales manager of both companies and Harry W. Easterly, Jr. is executive vice-president of the two operations. The North Side plant is under the management of John Guidt; Charles Houchens is foreman.

## NORTHWEST PRODUCERS MEET

Pictured at the head table at the annual meeting of Concrete Products Association of Washington are, left to right, Kenneth E. Kohler, assistant manager, Concrete Products Association of Washington; Talbot Campbell, president; Mrs. C. M. Howard, C. M. Howard, engineer-manager, Concrete Products Association of Washington; Harold C. Lutes, retiring president; Mrs. Lutes; G. Roy Long, Vancouver, B. C., a featured speaker; Mrs. A. W. G. Clark; A. W. G. Clark, B. C. Concrete Co., Vancouver, B. C.; Mrs. Long; Mr. and Mrs. R. F. McCleery, Marpole Brick Co., Vancouver

ENJOYING THE LARGEST turn-out of its history, the Concrete Products Association of Washington had a very successful twenty-second annual summer meeting June 8-10 at Harrison Hot Springs Hotel, British Columbia, Canada. The 175 members and guests attending enjoyed the excellent program and luxurious living offered.

The program included recreation but called for one major business session on Saturday morning, June 9. Headlining this session with the election of officers for the coming year. Talbot Campbell, Seattle Concrete Pipe Co., Seattle, Washington, was unanimously elected president of the association. One of Mr. Campbell's several achievements in the industry was the furnishing of the huge precast units used in the recently completed concrete snowshed at Snoqualmie Pass, Washington. B. E. Harrison, Harrison Concrete Pipe Co., Tacoma, was elected vice-president; R. W. Condon, Graystone Concrete Products Co., Seattle, secretary; and Verne Frese, Layrite Concrete Products, Seattle, treasurer. Directors elected for a one-year term were: Harold Lutes, immediate past-president, Layrite Concrete Products, Spokane; J. W. Sullivan, Bremerton Concrete Products Co., Bremerton; and E. Ellis Cummins, Yakima Cement Products Co., Yakima.

Following the election, William A. Haley III, assistant to Howard F. Peckworth of the American Concrete Pipe Association, Chicago, discussed recent developments on the recently inaugurated Controlled Materials Plan.

E. W. Dienhart of the National Concrete Masonry Association was unable to be present for his scheduled talk on concrete masonry because of a hip fracture sustained by Mrs. Dienhart en route to the Coast.

The advertising committee held a short meeting in which the "*Sunset* Magazine Program" was discussed. James E. Ficken of Frederick E. Baker and Associates, advertising firm handling the *Sunset* advertisements, was introduced by R. W. Condon, who explained the campaign's purposes and results to date, wherein "product prestige" was stressed.

Saturday evening, preceding the banquet, cocktails were served to the guests through the courtesy of the B. C. Concrete Co. Ltd. and the Marpole Brick Co. Ltd. (McCleery & Weston), both of Vancouver, B. C. Dinner was followed by introduction of guests, and acknowledgments by president Lutes.

A. W. G. (Burt) Clark of B. C. Concrete Co. Ltd. introduced the guest speaker, G. Roy Long, Vancouver, B. C., who talked on "Me, Myself and I."

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### Damage Suit

PRESHRUNK MASONRY SALES CORP., Roanoke, Va., was recently awarded a judgment of $199,625 in its suit against Rish Equipment Co. and C. L. Fielder Co. for losses suffered in the collapse of a bin structure at its cinder block plant. The suit claimed negligence on the part of the accused companies to do necessary welding and proper inspection. The plaintiff had sought $750,000 for damages. Counsel for the plaintiff moved that the verdict be set aside on the ground of inadequacy. The defendants are also seeking to have the verdict set aside and the action dismissed.

# The New YODER *Continuous Mixer*

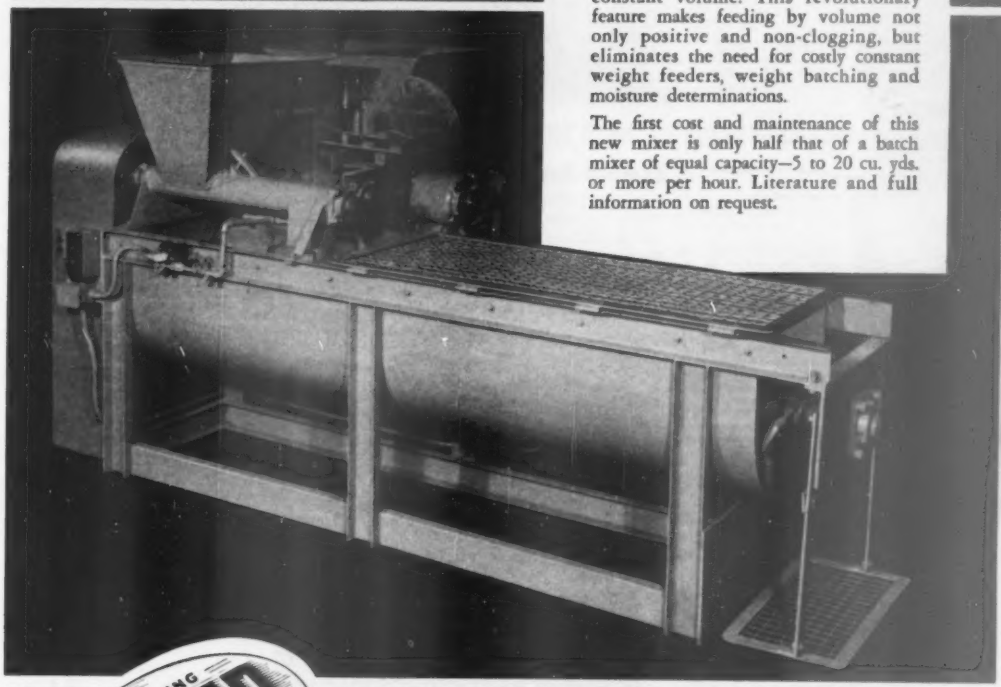
## has special advantages for LIGHT WEIGHT AGGREGATES

● Three spray nozzles at the entry end of the mixing barrel neatly solve the problem of continuous and automatic pre-wetting of the aggregate. As the mass passing under the sprays at all times is so small, thorough soaking takes place in the space of a few inches of travel, during which the aggregate is given over 200 agitations.

The cement enters at a point 6 or 8 inches beyond the sprays. Between this point and the exit end, the mix receives nearly 1800 agitations, resulting in concrete of superior strength, with maximum cement economy. Repeated tests have demonstrated 50% higher strength of concrete units than obtained from the average batch mix, using the same amount of cement.

*A vibrating belt feeder* reduces all aggregates, regardless of moisture contents, to constant volume. This revolutionary feature makes feeding by volume not only positive and non-clogging, but eliminates the need for costly constant weight feeders, weight batching and moisture determinations.

The first cost and maintenance of this new mixer is only half that of a batch mixer of equal capacity—5 to 20 cu. yds. or more per hour. Literature and full information on request.



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**Concrete Machinery Division**

**THE YODER COMPANY**

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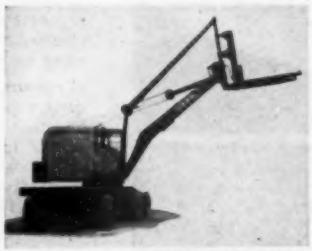
# NEW MACHINERY

## Fork Lift Stacker

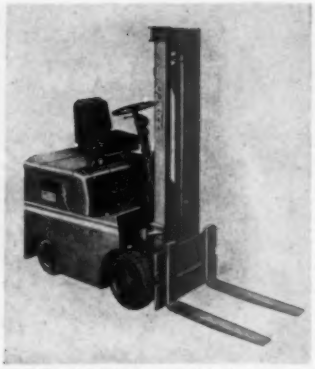
THE THEW SHOVEL CO., Lorain, Ohio, has developed the Swing-Stacker, said to be a new concept of fork lift equipment to meet difficult material handling problems. A standard self-propelled carrier and turntable is used, and on this is mounted a specially designed front end that consists of a hydraulically-operated fork lift attachment fixed to a boom. The 7-ft. long forks have a vertical lift of 9 ft. 8 in., can rotate 180 deg. and can be tilted up and down approximately 10 deg. The lifting capacity of the machine is 5000 lb. and the top travel speed is 7 m.p.h. with load.



Fork machine with 5000-lb. lift capacity

## Extends Fork Truck Line

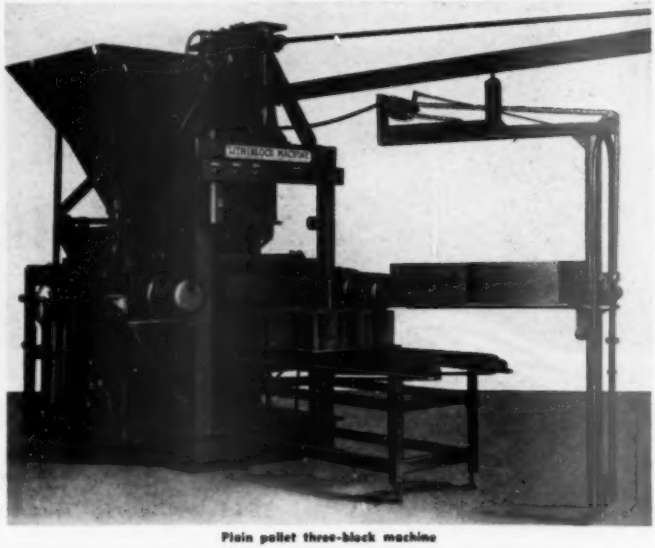
CLARK EQUIPMENT CO., Industrial Truck Division, Battle Creek, Mich., has announced its new Clipper, an electric battery-powered fork-lift truck. Standard equipment features include increased speed, 2000-lb. capacity at 24-in. load-center, "finger-tip" directional lever, automatic acceleration, pivot-mounted steering axle and cushion-style tires. Dimensions are: overall length, less forks, 63⅝ in.; overall width, 34½ in.; wheelbase, 37 in.; turning radius, 61½ in.; and minimum intersecting axles, 57 in.



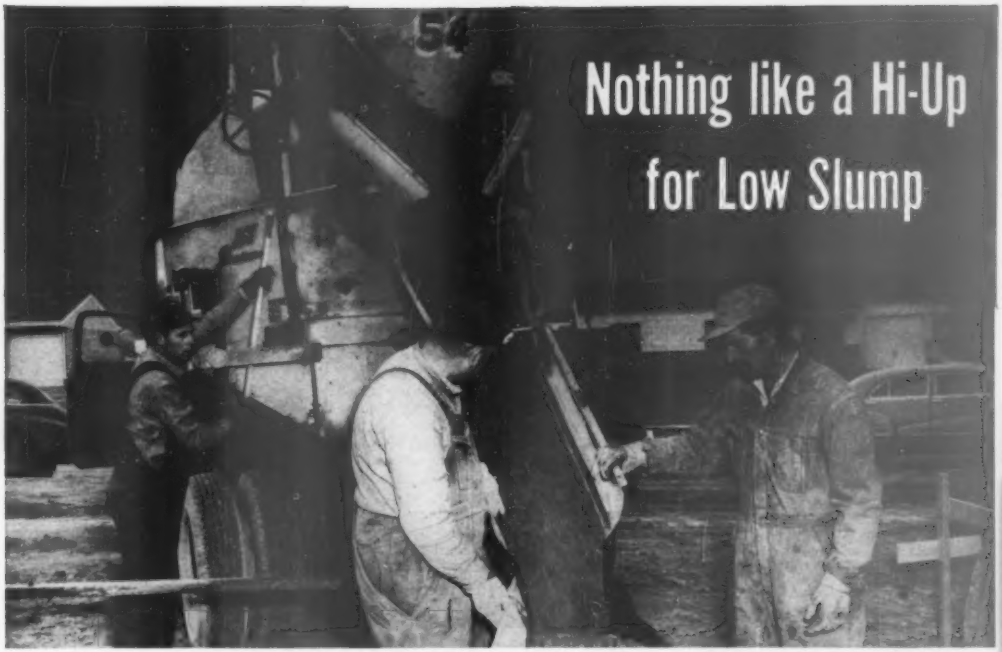
Electric battery-powered fork truck

## Plain Pallet Machine

LITH-I-BAR CO., Holland, Mich., has announced a plain pallet, three block machine, model L-5, claimed to feature a no-stoop pneumatic offbearer. The machine has a rated capacity of 720 8-in. equivalents per hour. The new offbearer is a full swiveling, counter-balanced unit that permits rack loading and pallet handling from any angle around the unit. Controls for the pneumatic motor are mounted at waist height so that the operator can stand erect while the pallet forks move on a vertical track.



Plain pallet three-block machine




**All over the country, Worthington-Ransome Hi-Up Truck Mixers are out-performing other makes!**

Photo of 4½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixer fleet operated by Concrete Inc., Denver, Colorado.

Photo of 5½ cu yd Worthington-Ransome Blue Brute Hi-Up Truck Mixers operated by Lattanzio Transit Mix Co., Inc., Schenectady.

Compare them on the basis of charging and discharging time . . . compare them on the basis of maintenance—

You'll find that Worthington-Ransome Blue Brute Hi-Ups score way ahead of other makes.

You'll surely want to experience results like these—

Fred D. Hoppe, vice-president, Concrete Inc., Denver, says, "Charging and unloading time is the lowest in our fleet of 26 units. We particularly like the way they discharge low and no-slump concrete. We experience less 'down time' with these machines than anything else in our fleet." Mr. Hoppe purchased *six more!*

Lou Lattanzio, Lattanzio Transit Mix, Schenectady, says of his 5½ cu yd Hi-Ups: "We are very pleased with the discharge rate even with low-slump concrete. There has been no appreciable mechanical trouble." Mr. Lattanzio "expects to standardize on Hi-Ups."

So join the growing list of Hi-Up fleets, which include Pine Hill Concrete Mix, Inc., Buffalo—over 40 Hi-Ups; Southern Materials Corp., Richmond and Norfolk—over 20; Buzby Brothers, Westville, New Jersey—over 20; Fenton Materials Co., San Diego—over 20.

**See your nearby Worthington-Ransome distributor for a demonstration.** Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, New Jersey.

*BUY BLUE BRUTES*

**WORTHINGTON**

R.1.4

## Central Mix Plant

*(Continued from page 228)*

building supplies and, in addition, produces a well diversified line of products for the building industry. It owns, in part, the Akron Brick and Block Co., Mogadore, Ohio, which operates a large, well established block plant with two Besser Vibrapac machines.

One of the first perlite expanding plants in the East was established by the company at Akron where lightweight aggregates for both plaster and concrete are produced in a Muehleisen stationary furnace. "Ohio Perlite" is sold in 4-cu. ft. bags.

Perlite is being mixed with concrete sand to produce, among other products, partition tile which are being sold in competition with gypsum block. These units are manufactured on the Besser machines to meet a compressive strength test of 260 p.s.i. at 28 days, using a mixture of 80 percent perlite and 20 percent sand.

Sand and gravel have been produced by Loomis for many years and, four years ago, a gypsum plaster mill was built. Stucco is purchased and mixed with sand or perlite and retarders, etc., in the manufacture of plasters. Silica sand is dried and sacked for sand-cement plaster.

In addition to the foregoing, the company handles a complete line of building supplies including masonry joint reinforcing, clay pipe, brick and many other products. Sand and gravel are being sold in the Cleveland market area and, on the other hand, slag and crushed stone are stockpiled at Akron for local sale.

All operations with the exception of the block plant are centralized on a 16-acre site where the main office is located. Carl Shoaff, vice-president and general manager, heads up all operations of the company. Mr. Shoaff has been associated with the ready-mixed concrete industry since 1927 and, until six years ago, was associated with Metropolitan Concrete Co., Cleveland, Ohio.

L. W. Camp is president of the company; R. L. Taylor, sales manager; R. W. Collins, general superintendent; and J. A. Michaels is secretary-treasurer.

## Government Competition

HENRY COUNTY, MO., is now producing its own concrete pipe. The new project was decided upon in order to reduce costs and to insure an adequate supply of culvert pipe. It was estimated that enough money could be saved in one year's operation to offset equipment and transportation costs. The concrete pipe are made in three sizes—24 in., 36 in. and 48 in. dia., all in 4-ft. lengths. The 36- and 48-in. pipe are being reinforced with wire mesh.

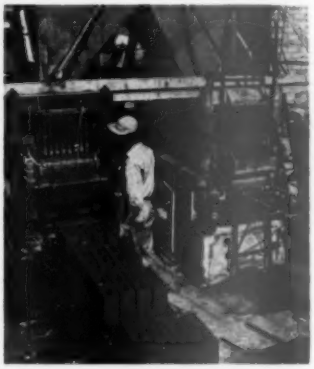
The county purchased the forms for casting pipe and built its own yard derrick out of bridge iron. The county formerly used metal pipe for culvert work.

## Single-Unit Plant

*(Continued from page 229)*

namental units as capstone for garden walls, stepping stones and brick, to name a few.

"By adding color to the mix from which these special units are made," he says, "they make an attractive display and certainly help increase our drive-in-sales which are a very important part of our business. Besides more than meeting our payroll, our drive-in-sales give us an opportunity to know first hand and to be known by a large number of people, all of whom are potential customers for more block at some later date. Their good will is a valuable asset which we try to hold with good merchandise. We find that these customers, as well as architects and contractors, do not mind a slightly higher price for our precision block, and by precision we mean concrete masonry units that do not vary in dimension."



**The two block machines at North Hollywood Concrete Tile's plant; the one at the left is electronically controlled**

Forced by added sales volume to purchase more equipment, North Hollywood Concrete Tile Co. installed in March of this year its second Columbia block machine, together with a companion mixer to feed both units.

The new machine is the electronically-controlled No. 8 automatic model, similar to the model that attracted much attention at the National Concrete Masonry Association Cleveland convention last January.

## Ready-Mix Plant

ROSS ISLAND SAND AND GRAVEL CO., Portland, Ore., is establishing a branch operation in Longview, Wash., which will become a permanent plant with a daily capacity of 600 cu. yd. of ready-mixed concrete. The company first began operations at Longview while furnishing concrete for a pulp-mill expansion project of Weyerhaeuser Timber Co. The company is now offering its products for residential and commercial use in the community. Some of the products offered are: premixed concrete; concrete sand and gravel and dry mix; sand mix; and mortar mix.

# FORUM
## ON CURING CONCRETE PRODUCTS
conducted by WILLIAM J. SHORE

**Question**

We recently installed a special type of boiler of 30 hp. to steam cure our daily production of block. We have three machines and we produce 2500 block per hour.

We have eight kilns for curing and they are all alike. They are 13.5 ft. wide, 65 ft. long, and 7 ft. 6 in. high. The roof is of reinforced sandstone concrete 10 in. thick. The walls are of concrete block and all the block voids have been filled with cement mortar as they were put into place.

We started the 30-hp. boiler and fed steam to the first kiln which contained a charge of 2500 concrete block. After 5 to 6 hr. steaming we failed to observe any increase in temperature over 80 deg. F. We could not get the temperature over that figure. Please tell us what is wrong.

**Answer**

To bring 2500 concrete block from 45 to 140 deg. F. in a matter of three to four hours normally requires 50 hp. But after studying the construction of your kilns, we believe it will require a total of 75 hp. to bring this number of block to 140 deg. F. in four hours or so.

For steam curing your total block production you will require a total of 225-hp. steam boiler capacity. This may be in one unit of 225 hp., or one 150 hp. and one 75 hp., or three 75 hp. units.

Where a kiln is practically monolithic masonry, before block can develop heat rise, the surrounding enclosure must also be heated up in equal degree, and in fact, it will require more to heat the kilns than it will to heat the block.

## Concrete Products Meetings

THE MO-KAN CONCRETE PRODUCTS ASSOCIATION, a newly formed association, held an afternoon meeting with invited guests from the concrete block industry in Missouri and Kansas, June 15, 1951, at Kansas City, Mo., for the purpose of providing an opportunity for wider acquaintanceship among the manufacturers. The meeting was followed by a dinner which also included a number of representatives from the newly formed Masonry Contractors' Association of Greater Kansas City Area. The guest speaker for the occasion was Forrest D. Byars, chairman of the Kansas City Public Housing Authority, who spoke on "Public Housing Plans for Tomorrow." George W. Goelitzer, Cinder Concrete Products, Inc., Kansas City, Mo., is president of the Mo-Kan Concrete Products Association.

•

CONCRETE MASONRY MANUFACTURERS ASSOCATION held a general membership meeting June 26, 1951, at the Rodger Young auditorium, Los Angeles, Calif. Guest speakers at the meeting were Leo Farrell, assistant to the area manager of the Department of Employment, State of California, who spoke on "Unemployment Insurance"; and E. Raymond Throsby, of Corporation Counseling Service, who spoke on the subject of "how to correct any irregularities whatsoever that will be of benefit to the employer."

MEETING LOAD LIMITATIONS WITH HIGH CAPACITY

# 5 OUT OF 6

## Large Producers of Ready Mixed Concrete in the Miami, Florida and NOW use...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*There must be a Reason!*

NEW LOW PRICE

# CONCRETE TRANSPORT MIXER CO.

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*Serving the CONCRETE INDUSTRY 20 YEARS*

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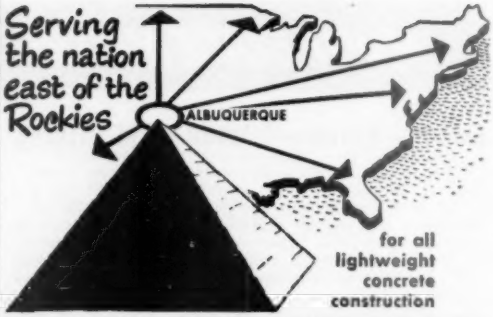
*Serving the nation east of the Rockies*

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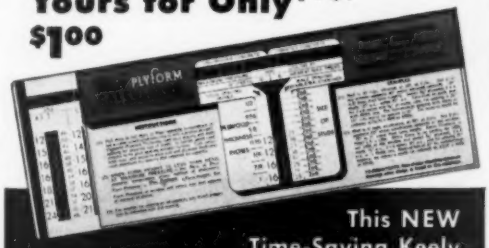
**Yours for Only $1.00**




This NEW Time-Saving Keely

## PLYFORM CALCULATOR

SAVE time designing and building forms of PlyForm, the concrete form grade of Douglas fir plywood. Handy slide-rule calculator gives construction data, based on hourly rate of pour. Included is booklet, "Design Assumptions for New Keely Calculator." Clip coupon — now!

DOUGLAS FIR PLYWOOD ASSOCIATION DEPT. 21
Tacoma 2, Washington

Offer good in U. S. only.

Please send me ..... Keely PlyForm Calculators.
I enclose $1.00 each to cover costs.

Name .....

Address .....

City ..... Zone ... State .....

☐ Also please send me, at no cost, copies of "Concrete Forms of Douglas Fir Plywood", and "Handling PlyForm".

---

# Handle ANY JOB in a concrete Pipe Plant

with an *Erickson* POWER LIFT TRUCK

- Carry concrete bucket
- Lift bucket over form
- Charge pipe form
- Remove cone from form
- Pull out core
- Strip outside form
- Tip over finished pipe
- Stockpile pipe
- Load pipe on trailer

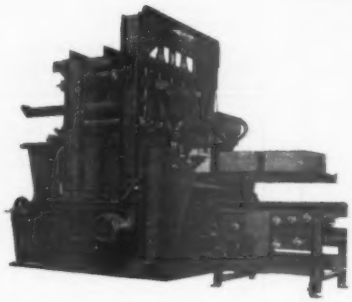
Picture shows Model F-66 with boom attachment, capacity 6000 lbs. Also F-10, capacity 10,000 lbs., and F-16, capacity 16,000 lbs.

*Write for Literature*

*Erickson* POWER LIFT TRUCKS, Inc.

1405 Marshall Street N. E. • Minneapolis 13, Minnesota

# THERE MUST BE A REASON..



Built by people who are well known throughout the industry. People who are pioneers in the manufacture of block making machinery.

Sold by a Distributor who has built his business on fair dealing with a money back guarantee should any machine sold by them fail to give expected results.

***Why so many of our customers are changing over and using GOCORP Block Machinery?***

GOCORP Block Machines have been on the market less than 3 years, yet over 200 of these machines are now in operation and giving satisfactory service. Their rugged construction, simplicity of design, along with the ease with which they operate, place them outstanding among the leaders.

If you are considering installing new block making machinery why not investigate GOCORP? Write or phone us for descriptive literature—better still—visit one or more plants that are using GOCORP Machines and see them operate. A list of these plants is available for the asking.

GOCORP manufactures block machines that will produce from 2,000 to 12,000 block per 8 hours of operation, depending on your requirements (and you can own these machines outright).

## USED EQUIPMENT FOR SALE

(4) No. 9 Joltcretes, complete
(1) No. 7 Joltcrete, complete
(7) Model "A" Stearns Clippers
(2) 18′ Stearns Skip Hoists
(2) 42′ Stearns Skip Hoists
(1) 42′ Stearns Mixer
(1) 18′ Stearns Mixer

10,000 3¾x15¾ P.S. pallets (ZONAL)
20,000 7¾x15¾ P.S. pallets (BABA)
6,000 11¾x15¾ P.S. pallets (PADDLE)
5,000 5¾x15¾ P.S. pallets (TOTEM)
10,000 4x16 P.S. pallets (ZORILLA)
4,000 4x16 Cast Iron pallets
5,000 8x16 Cast Iron pallets

All pallets in new pallet condition
Send Drawings

## METROPOLITAN EQUIPMENT COMPANY

Office and Warehouse:
3603 18th Street, N.E. Washington 17, D. C.
Telephones: MIchigan 1535—1536

YOUR GOCORP DISTRIBUTOR FOR
Maryland—Virginia—Delaware—North Carolina—Eastern Pennsylvania—Southern New Jersey—Eastern West Virginia and The District of Columbia

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

## FOR SALE

**JOLTCRETE BLOCK MACHINE**
**Stearns No. 9**

with complete attachments, and in good operating condition.

**PRESSED STEEL PALLETS**
for above listed machine

3600—4" ZONAL
4000—8" BACCA
500—12" PAMPAS
100—12" PALM

also: 400 cast iron multiplex chimney block pallets, size 16" square with 9" flue

**MOLD BOX ATTACHMENTS**
4"—8" and Chimney Block attachment

RACKS—for above listed machine
100 racks of 72 block capacity

3—TURNTABLES—Size 7' x ½"

**This equipment may be inspected at our Kings Landing Plant. The Stearns No. 9 Joltcrete is operating every day. Your inquiries invited.**

**CRANDALL'S CONCRETE PRODUCTS**
**BOX 119** **BENTON HARBOR, MICH.**

---

**FOR SALE**

Concrete block plant consisting of:

1—Stearns #9 Joltcrete Block Machine

1—27 cu. ft. Stationary Mixer

1—4" Box about 3200 Cast Iron and Aluminum Pallets

1—8" Box 2200 Standard Pallets, 700 Corner Pallets

1—12" Box with 2000 Pallets.

All electrical control boxes. All steel vibrating table on machine.

30—48 Block steel racks and trays Extra electric motors and some new parts.

Will sacrifice for $4500.00

**DUFFEK SAND & GRAVEL CO.**
**ANTIGO,** **WISCONSIN**

---

**UNUSUAL OPPORTUNITY**
**to own and operate**
**BESSER VIBRAPAC BLOCK PLANT**

One of the best plants—located in a busy section of Eastern Pennsylvania. R. R. Siding Large, well established. Second machine No. 9 Joltcrete with pallets. Fully complete with Blaw-Knox Steel four compartment bins, weighbatcher, bulk cement equipment. Nine kilns with new boiler and oil burner. Lintelator, crusher, two Towmotors, one Clark lift truck, Scoopmobile, five motor trucks. Would cost well over $225,000 to duplicate. Business should be more than $400,000 with excellent profit. Priced to sell—Good reason for selling. Some cash required and successful block plant background essential.

**Write or Wire:**
**Box J-82 CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.**

---

**SALE OR RENT**

4—Rebuilt Rex Low Discharge Mixers, ready for use.
1—Ransome 34-E Dual Drum Paver, now being used available Aug. 15.
1—Blaw-Knox 3-Compartment Aggregate Bin, complete with Aggregate Weigh-Batcher and Scales.
1—Northwest 105 Crane, 1-yd. Haywood Clamshell Bucket.
1—2-yd. Ransome Stationary Mixer with new Discharge Chute and Liner.

**SOUTHERN MATERIALS CO., INC.**
**Box IJ, Richmond 1, Virginia**

---

**FOR SALE**

1—Model c-407 Stearns Clipper Stripper block machine.
1—14 s plant paddle type concrete mixer.
1—Automatic concrete skip and hopper.
1100 4" wide by 16" long pallets.
1100 8" wide by 16" long pallets.
1—two block 4x8x16" mold box, 1—one block 8x8x16" mold box; with attachments to make halves and corners.
330 lineal feet of narrow gauge railroad track.
34-56 block capacity steel racks.
1—Automatic platform lift truck.
Plant is complete with all electric switches and motors.

**THURMAN BROS.**
**650 N. Magnolia** **El Cajon, Calif.**

---

**CONCRETE BRICK COLORS**
**CEMENT COLORS**
**MORTAR COLORS**
***made by***
**BLUE RIDGE TALC CO., INC.**
**Henry, Virginia**

---

1—Besser Master Tamper. Makes plain and face block. Capacity 1200 block per 8 hrs. 8000 Pallets.
Mixer, Loader, Motors Complete.
250 ft. Narrow gauge Railtrack.
25 carts (60 block each).
1—Western Air Vibrator Block Machine (1200 block per 8 hrs.)
1500 Manganese pallets.
1—5 H.P. Air Compressor.
Both machines feed on same mixer. Price $4800

**LAKE ZURICH CONCRETE PRODUCTS, INC.**
**Lake Zurich** **Illinois**

---

**FOR SALE**

Truck Mixers 2 and 3 yd. some in good condition—being operated daily—others need some repairs.

**MARION S. BRANCH CO.**
**P.O. Box 596** **Lynchburg, Va.**

---

**FOR SALE**

1—Hand operated "Korpac" Block Machine ..... $700.00
1—"Pacrete" Block Machine less than a yr. old..... $1,000.00

**CEMENT PRODUCTS CO.**
**Peoria, Ill.**

---

Going Strong—$60,000 Pumice and Cement plant — Columbia Valley Basin—Age of owners reason for selling. Special terms to right parties.

Box J-72 Concrete Products,
309 W. Jackson Blvd., Chicago, Ill.

---

**FOR SALE**

18—54B—3 Decker Concrete Block Cars. For 30 Gauge Track.
1—Leahy 8x3 Double Deck Vibrator Screen with Self Contained Motor.

**BLAIRSVILLE CONCRETE PRODUCTS CO.**
**100 W. East Lane** **Ph. 11 Or 12**
**Blairsville** **Pa.**

---

**FOR SALE**

Dunbrick Machine complete with pallets, racks and some spare parts. Makes over 12,000 bricks per day. Very reasonable.

**CAYUGA SUPPLY CO., INC.**
**Box 72, LaSalle Station**
**Niagara Falls, N. Y.**

---

**FOR SALE**

Established block plant in central Calif. New Columbia block machine. Plant building, steam curing facilities. Flat bed and dump truck, fork lift. Doing fine business, with room for further expansion.

**Box J-80 CONCRETE PRODUCTS**
**309 W. Jackson Blvd., Chicago 6, Ill.**

---

**FOR SALE**
Concrete Block and Tile Plant
**New Port, Oregon**

Modern, well equipped; making 1100 8x8x16 modular concrete or pumice blocks daily. Columbia semi-automatic block machine, Champion Drain Tile Machine, and complete equipment. Ample ground for storage and expansion. Good, uncompetitive market. For sale account dissolution ownership. Price approximately $27,000, terms.

**NEWPORT CONCRETE PRODUCTS CO.**
**P. O. Box 247** **Newport, Oregon**

---

**FOR SALE**

Complete plant equipped to produce 1000 blocks per day. Must be moved from present location.

**H. H. ROBBINS COAL & SUPPLY CO.**
**316 N. Oak St.** **Bluffton, Indiana**

---

**FOR SALE**

Used ready-mix truck with 2 yd. high dump Jaeger mixer, 1950 2½ ton Dodge truck. Excellent condition. Can be seen in use.

**CONCRETE SERVICE CORP.**
**P.O. Box 349**
**Glen Ellyn** **Illinois**



**ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION**

**PACKER-HEAD WINGS**
Both McCracken Type and Martin Trowelers—PROVED to last as long or longer—yet cost considerably less
Write for prices.
**TEXAS FOUNDRIES**
LUFKIN, TEXAS

**CEMENT BATCHING PLANT**
Complete, including aggregate bin, cement bin and batcher and cement elevator.
**FRANKLIN LIMESTONE CO.**
P.O. Box 910 Nashville, Tenn.

**FOR SALE**
1 Scripps-Pierson semi-automatic block machine (3 blocks), with 8" block mold and six block cesspool mold capacity: 2000 8x8x16 block per day—also 1, 15 horse, 3 phase Scripps-Pierson mixer. Can be seen in operation until Sept. 1, 1951. Total Price $7,000.00.
**WHITE'S CONCRETE BLOCK COMPANY**
6219 E. Trent Ave. Spokane, Washington

**FOR SALE**
1—No. 7 Jolterete with 4", 6", 8" and 12" Mold boxes. 2000—4" Pallets, 2000—6" Pallets, 2400—8" Pallets. Machine in use every day. Available August 20th. Price $2400.00 for everything listed. Replacing with larger machine.
Write or call:
**WEBB CONCRETE BLOCK COMPANY**
Scottsboro Alabama

**CONCRETE PRODUCTS CO.**
Produces Concrete Tile ranging from 4" to 12" in size.
Excellent Opportunity
Write
**JOHN WEIGLE'S COMPANY**
8 South 16th Street, Lafayette, Ind.

**USE THE**
**CLASSIFIED**
**COLUMNS OF**
**CONCRETE**
**PRODUCTS**
**THE MOST**
**ECONOMICAL**
**WAY TO SELL**
**YOUR USED**
**EQUIPMENT.**

**WANTED**
Stearnes Cored Pallets new or used, aluminum or steel, flat non ribbed only
3¾ x15¾—45% cores
7¾ x15¾—45% cores
Quote prices—send samples.
**MARBLE FACE BLOCKS, INC.**
565 Fifth Ave. New York 17, N. Y.

**ANTHRACITE CINDERS**
A car load or a train load. Our supply is unlimited. Processed ready to use. Locations on Baltimore & Ohio, Pennsylvania, Lehigh Valley, and Reading Railroads. Call or write
**R. P. McMINDES COMPANY**
P. O. Box 52 Ashland, Penna.
Phone: 367

**FOR SALE**
Block factory, building and machinery, extra lot, gravel pit, truck, low boy trailer, gas shovel, hydraulic Bulldozer. This is a going business—believe me. Reasons for selling.
**BOX J-81 CONCRETE PRODUCTS**
309 W. Jackson Blvd., Chicago 6, Ill.

**FOR SALE**
2—Bartlie machines w/motors
2—Bartlie Ridge and side stands
1200 Bartlie Pallets
90 Drying racks 6 Moving Carts
1 large immersion tank
1 cutting table
**PERMA-STONE DALLAS CO.**
3406 Lemmon Avenue Dallas, Texas

UNBREAKABLE
PALLET RINGS
Write for full information
TEXAS FOUNDRIES
LUFKIN, TEXAS

TWO HYDRAULIC—Hand lift trucks, 3,500 lb. capacity. Exceptionally good condition. Price $200.00 each. One truck has bed 38 inches long, other one 62 inches long. Other measurements both trucks: In lowered position, 10 inches from floor. Widths: Beds, 26½ inches. Lift, 3 inches. Wheel bases, 30 inches. Write or call John Stoops, RFD 1, New Paris, Ind. Phone New Paris, 312.

**FOR SALE**
36", 42", 54" and 72" Cast Pipe Equipment.
**SOUTHERN BLOCK & PIPE CORP.**
P. O. Box 1778
Norfolk 1 Virginia

**FOR IMMEDIATE SALE**
(1) Model A Clipper Stripper Block Machine with 4", 8", and 12" mold boxes. Excellent condition. Will sell complete—$995.00.
(1) 18 cu. ft. Mixer. Good Condition.—$195.00.
**S & S BUILDING PRODUCTS COMPANY**
P. O. Box 7 Hazelton, Penna.

**FOR SALE**
Used Hyster 20 Fork-Lift Truck: Motor Overhauled, Hydraulic system in good condition, new battery, new rubber. No Forks. Price $1250.00 F.O.B. Dothan.
1—Stephens-Adamson Cor Puller, 5 HP Fully Inclosed, Good Condition. Price $250.00.
**SPEIGNER CONCRETE BLOCK CO.**
Dothan, Alabama

**FOR SALE**
400 Multiplex 16x16 Chimney Pallets with 10¾" round flue. 6" — 8" — 10" Thimbles.
Vents and Cleanout Castings.
Cleanout Plates and Pattern.
Rebuilt Multiplex Chimney.
Block Machine.
**JOHN T. STOOPS**
R. R. No. 1 New Paris, Indiana

**OPPORTUNITY**
WEST FLORIDA Building Supply Dealer, well established, and doing a half-million annually wishes to contact experienced Concrete Block Operator with good equipment who will consider moving his operation to our market on 50-50 corporate set-up. We will provide excellent site, RR siding, established market, and our share of funds. This is an excellent opportunity for a small or medium size operator who is not selling his output.
**Box J-74 CONCRETE PRODUCTS**
309 W. Jackson Blvd. Chicago 6, Ill.

**FOR SALE**
Crushed and sized cinder aggregate, tested and approved for the manufacture of cinder blocks. Write:
**DULUTH CINDER, SLAG & STONE CO.**
Box 116 Duluth 7, Minn.

**FOR SALE**
Portable Barber-Greene Model N. Transfer Conveyor 36 ft. long 24 in. wide belt covered. Built to transfer dry batches from dump truck into transit mixer trucks. Could be used for Stock piling and unloading railroad hopper cars. Trailmobile 4 wheel trailer 16 ft. x 8 ft. Flat bed Air brakes on both front and back axle. 900x20 tires.
**FLEGAL'S READY MIX CONCRETE**
R. R. No. 4 Angola, Indiana

1—180 Fleming Block Machine—Like new. Approximately 3000 — 50% Air Space, Cast Iron Cord Pallets.
1—7¾ x7¾ x15⅝ Rock Face Mold.
1—Plain Face Mold.
1—4" Mold for Multiplex Super Tamper Block Machine.
**REEVES CONCRETE PRODUCTS**
Granite City Illinois

**FOR SALE**
1—Used Brick Attachment for Stearns Stripper Clipper, modular size brick, used twice.
1—Used Appley Little Giant block machine, complete ready to go, about 800-8" cast pallets.
**GOODMAN CONCRETE PRODUCTS**
Box 905 Bemidji Minnesota

**FOR SALE**
No. 7 Jolterete with power carriage and height control for making 4", 6", 8" and 12" 3 core 45%. Also molds for making 8x16x16 flue and liner chimney blocks. 8000 commercial steel pallets for making above sizes. 64 steel racks 42-8" capacity. Kent Pallet Oiler. $5000.00 F.O.B. Carlisle, Pa. This equipment in A-1 condition.
**RALPH E. GIBSON**
Carlisle, Pa. Phone 891

**STOP *that* WATER**
**With FORMULA NO. 640**
A clear liquid—7 different rooms in a solvent which penetrates 1" or more into concrete, concrete blocks, stucco, coats, holds 1250 psf water pressure. Applies quickly—no mixing—no furring—no built brace—no cleanup. Use on forms—used or concrete.
**HAYNES PRODUCTS CO., OMAHA 3, NEBR.**

**WANTED**
30 used Block racks for 18x18 plain pallets, also used 500 BBL Bulk Cement bin and elevator.
**"Lackey's" Kingsport Block Co.**
Kingsport Tenn.

**CEMENT COLORS**
Write for free samples and prices of "LANSCO" CEMENT COLORS produced in 34 attractive shades. Packed in bulk and in 1 lb. and 5 lb. packages.
*manufactured by*
LANDERS-SEGAL COLOR CO.
73 Delevan St. Brooklyn 31, N. Y.

## INDEX TO ADVERTISERS IN THE CONCRETE PRODUCTS SECTION OF ROCK PRODUCTS

ALSO SEE INDEX OF ROCK PRODUCTS SECTION ADVERTISERS ON PAGES 269, 270

LOOK! JOE . . . I made this cut with my Clipper in 5 seconds!


*Yes...*

# CLIPPER MASONRY SAWS

## Make *Any* Cut Quickly and Easily!

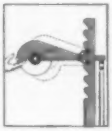
Yes, you can slice through the hardest materials in seconds with the New Clipper Masonry Saws. Smoother, faster cutting action than ever before. You'll find Clipper's the Genuine answer to any masonry cutting problem. Contractors agree on the New wet or dry cutting Model HD for the 100% Answer to ALL masonry problems. Actually the HD is Two Saws In One—it will meet your DUSTLESS cutting requirements in confined areas and will cut dry for outside operations. Every Clipper Masonry Saw is GUARANTEED, "To provide the Fastest Cut . . . at the Lowest Cost . . . with the Greatest Ease . . . Any Time . . . Any Where!"

## PACKED WITH EXCLUSIVE FEATURES

### DUSTLESS CUTTING WITH MODEL HD

**PRESSURE EQUALIZER**
Makes your blades last longer . . . because Equalizer Spring automatically cushions blade pressure whether cutting HARD or SOFT materials. Guarantees faster cutting—longest blade life. Outstanding for blade economy.

**SELECT-A-NOTCH**
One man easily adjusts Cutting Head to desired height . . . whether cutting Stone, Concrete Block, Glazed Tile or Quarry Tile. Operator's hands merely guide — All weight supported by rear Connecting Bar.



**ADJUST-A-CUT**
Merely pull the knob — and the Cutting Head is free for finger tip setting at any desired angle. Release the Knob — and head is locked in desired position. Another Clipper Patented Feature.

**SAVE-A-BLADE DIAL**
Just turn the Save A Blade Dial to the hardness of the material you are cutting and the Clipper Pressure Equalizer Spring automatically sets the tension, to guarantee faster cutting and longer blade life — whether the material is HARD or SOFT. Whether using Diamond or Abrasive Blades. Cutting Wet or Dry with the Dustless Model H.D. (Not on Model C Saws.)

**WET-OR DRY PUMP**
No need to remove belt when cutting dry. No maintenance . . . Factory Sealed . . . An exclusive Clipper development. Patented Water Application Unit systematically controls water flow.

## Only Clipper Has NINE Models To Choose from!...

Not ONE Model—Not TWO Models . . .
But NINE separate and distinct Clipper Saws for you to choose from. Each completely different in price, in size, in performance. Select the Clipper Model that EXACTLY SUITS YOUR particular needs!


**DRY ABRASIVE BLADES**
**WET ABRASIVE BLADES**
**DIAMOND BLADES**

Cut DRY—or cut WET . . .
Cut with ABRASIVE Blades—or with DIAMOND Blades . . .
In the more than 50 standard and special CLIPPER Blade specifications you will find THE EXACT SUPERIOR BLADE to cut YOUR materials AT THE EXACT SPEED YOU require!

Clipper
NATION-WIDE DIRECT FACTORY SERVICE

**MANUFACTURING COMPANY**
KANSAS CITY 8, MO.

PHILADELPHIA ● CLEVELAND ● AUSTIN, TEX. ● PITTSBURGH
WASHINGTON, D.C. ● CHICAGO ● ST. LOUIS ● SAN FRANCISCO
NEW YORK ● DETROIT ● CINCINNATI ● ATLANTA ● BOSTON

FREE TRIAL!

Nine Clipper Models available on FREE TRIAL. Priced from $195... Shipped Direct from Coast to Coast Clipper Factory Branches.

TEAR OFF AND MAIL

**CLIPPER MANUFACTURING CO.**
**2807 N. WARWICK ● KANSAS CITY 8, MO.**

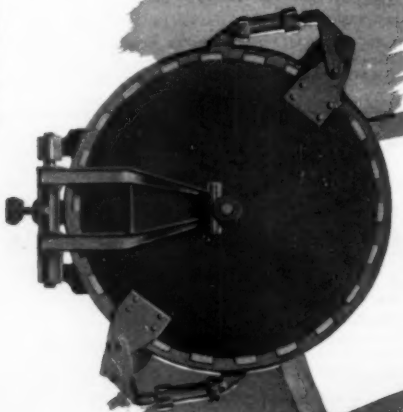
Send TODAY information on the FREE TRIAL offer and literature and prices on the 1950 Clipper Masonry Saws.

NAME _____
COMPANY _____
STREET _____
CITY _____ ZONE _____
STATE _____

# a combination that's hard to beat

High Pressure Kiln being loaded with blocks to be cured.

J & C Model "CP" Brick Press



## J&C HIGH PRESSURE CURING EQUIPMENT PLUS A J&C BRICK PRESS

**WITH J&C HIGH PRESSURE EQUIPMENT YOU CAN:**

- ..get all the shrinkage out of your product down to normal expansion and contraction
- ..do ten years curing in 12 to 15 hours
- ..use less cement for a better product
- ..make today .... sell tomorrow.
- ..reduce costs for handling, storage space and stock pile and save 15 to 25% over all

**WITH J&C MODEL "CP" BRICK PRESS YOU CAN:**

- ..produce up to 14,000 perfect concrete or sand lime brick per 8 hour shift
- ..apply 75 ton forming pressure to get a clean sharp brick
- ..make better brick....that lay up faster in a stronger, neater wall
- ..eliminate pallet costs because J & C made bricks need no pallet for handling
- ..modernize your plant, reduce production costs, and have a better product

Use the J & C combination . . . a J & C Model "CP" Brick Press for fast, economical production and a J & C High Pressure Curing Kiln for "shrink-proofing." Remember . . . get the shrinkage out of your brick and block and you'll eliminate one of the causes of cracking walls.

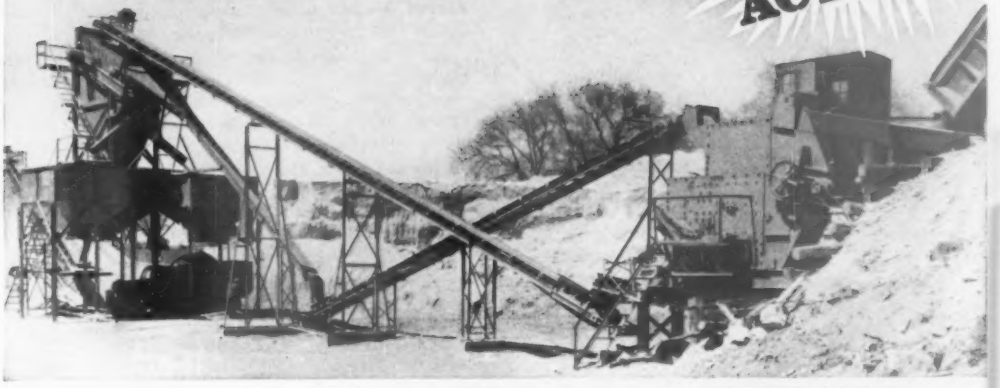
## JACKSON & CHURCH

*Hydraulic Kiln Door Cuts Opening and Closing Time by 90%!*

New J&C Kiln Door -- Hydraulically opened, closed, and locked.

*a product of* JACKSON & CHURCH COMPANY
SAGINAW, MICHIGAN
"WORK WITH DONE SINCE 71"

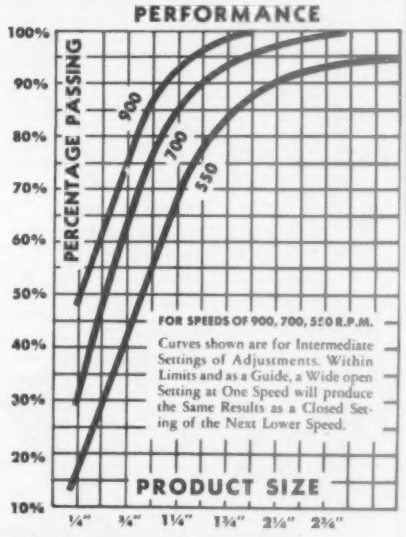
# MAXIMUM PRODUCTION OF WANTED SIZES WITH CONTROLLED IMPACT ACTION



## AN IMPORTANT ADVANTAGE OF THE PMCO IMPACT MASTER

Operating a single 3240 Impact Master in a closed circuit set-up is mighty profitable for Dillon, Sharpe & Company, Columbus Junction, Iowa. In a free running operation they are averaging 28% of $-1\frac{1}{2}$ plus $\frac{3}{4}$, 38% of $-\frac{3}{4}$ plus #4, and 34% aglime. By making simple adjustments on the Impact Master the percentage of sizes can be increased or decreased to meet demands. That's real flexibility. And what's more, when top production is required, the potential is there to produce over 225 tph.

Controlled Impact Action is the exclusive operating principle of the PMCO Impact Master. It makes possible a ratio of reduction that eliminates much accessory equipment, cuts power, labor and maintenance costs . . . and enables you to step into big production with a minimum investment. By controlling the in-fed rock and directing its flow practically 100% of the breaking is accomplished by rigidly mounted rotor hammers, producing a highly uniform gradation cubical product in one fast operation. Impact Masters are available with capacities to 500 tph. Get more facts and job proved figures. Write today for full information.




## PETTIBONE MULLIKEN CORPORATION

4700 West Division Street, Chicago 51, Illinois  Phone Spaulding 2-9300

# why "L-B" Cast Buckets give you longer life, cleaner handling

NEXT time you replace the buckets on your elevators, check into the money-saving advantages of Link-Belt Cast Buckets. You'll find their accurate balance and advanced design pay off in proper filling, clean discharge.

For a long, durable life — they're made of top-grade malleable iron or Promal (the stronger, longer-wearing metal) to resist abrasion, corrosion and hard usage. Smooth, seamless surface minimizes friction and wear. Corners are reinforced to give added strength.

Link-Belt builds all sizes in six different styles . . . for either chain or belt mounting. Complete L-B line also includes steel buckets of various designs. Contact your nearest Link-Belt office for complete information.

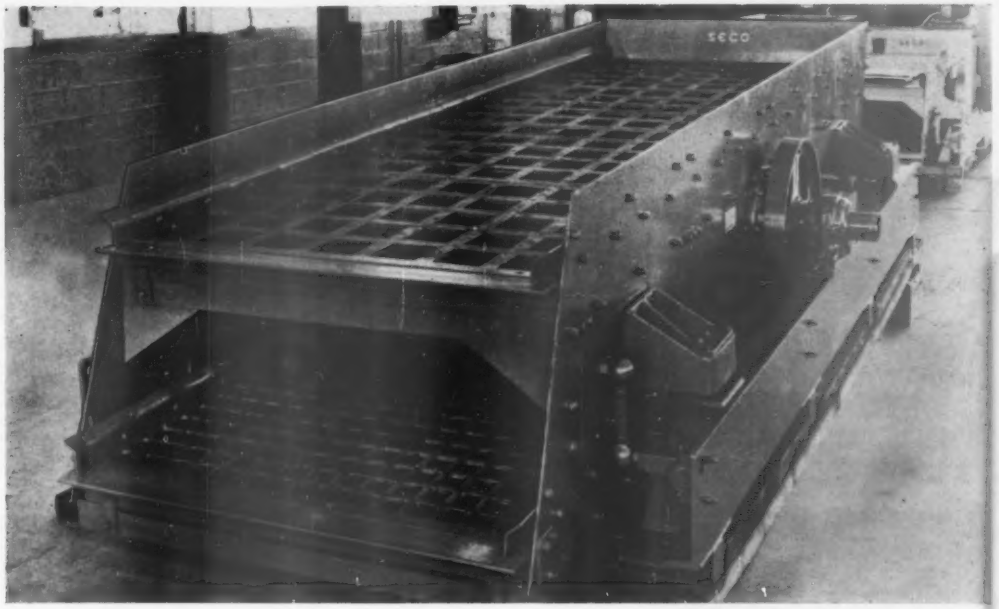
**LINK-BELT**

**CAST ELEVATOR BUCKETS**

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities. 12,517

# Another SECO "WORKHORSE"

**On the way to WATERS CONSTRUCTION CO., Elizabethtown, Ky.**




***FAST GROWING STONE CRUSHING COMPANY AGAIN CHOOSES SECO VIBRATING SCREENS AS RESULT OF ON THE JOB PERFORMANCE***

After *all* it's performance that counts. That's why Waters Construction Company of Elizabethtown, Ky., unhesitatingly chose this big 5′ x 14′ Seco double deck screen to help meet the ever increasing demands for their crushed stone products.

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***Manufacturers of the World's Most Complete Line of Spreaders***

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## BELT FASTENERS and RIP PLATES

***FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH***

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# CLASSIFIED ADVERTISING

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Complete Face Brick Manufacturing Plant (Granule Plant Included)
of former CRAWFORDSVILLE SHALE BRICK, Inc., CRAWFORDSVILLE, INDIANA
44 miles from Indianapolis. 140 miles from Chicago
WEDNESDAY, SEPTEMBER 12, 1951. 11 A.M. — C.S.T. on the premises

### GRANULE PLANT

3′ SYMONS CONE CRUSHER, Short head, V-belt drive and 50 H.P. 3/60/220 Volt Motor and controls; 9″ x 16″ Jaw Crusher; 3 Selectro heavy duty single and dbl deck Vibrating Screens; 3 Steel enclosed Bucket Elevators; Motors, etc.

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22 Acres with Clay Deposits.
5 Buildings, Various sizes.

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Office Equipment, Air Compressor, Piping, Instruments, Shafting, Pulleys, Spare Parts, Belt Conveyors, Brick Grinder, Bins, Baggers, Parts Room, etc.

### COMPLETE BRICK MANUFACTURING PLANT

CHAMBERS BROS. No.-10B DE-Airing BRICK MACHINE with Nash Vacuum Pump; 9′ Dry Grinding Pan; 20″ x 14″ Sturtevant double Roll Crusher; Rust auger type Clay Feeder; Bonnot Pug Mill; J. C. Steele Multiple No. 18 Combination Rotary Wire Brick and Tile Cutter; 2-6″ Gould m.d. Deep Well Pumps; 5′ Aluminum Fan with 25 H.P. Motor; Type K 300 Welder; 4 Reo and Ford Trucks; Col. Iron Wks 3′ x 6′ Vibrating Screen; 1—¾ YD. KOEHRING Full Revolving CRAWLER SHOVEL, Model 301 Gasoline driven. 162—3′ x 7′ Steel Brick Dryer Cars, 24″ gauge. 39—Winkler automatic Transmission Stokers, Models #7 and #10-4-6 Ceramic, each with ½ HP motor. 2—75 H.P. 3/60/220-900 RPM Motors and various sizes smaller motors — 10 — BRICK KILNS: 2—36″ and 1—120″ x 4′ Ventilating Fans, motor driven.
24″ x 16″ Jaw Crusher; HRT Boiler.
Approx. ½ mile light Industrial Track (rail)

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New Universal vibrating screens
PLAT-O three deck 3x6′ vibrating screen
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Seco single deck 4′x6′ vibrating screen
Leahy single deck 6′x8′ vibrating screen
Symons 2′ Cone crusher, 60 hp motor
Buchanan all steel "B" 10″x16″ jaw crusher
Jeffrey single roll 24″x24″ coal crusher
Double roll crusher, 18″x28″, heavy duty
Schutz-O'Neill mill pigment pulverizer
Dellinger No. 46 hammermill with dust collector
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Continuous and spaced bucket elevators
Elevators with 6″-16″ malleable buckets
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Enclosed 40′ elevator with 16″x8″ buckets
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93′x8″ belt with 51 stainless 6″ buckets
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Flat and V pulleys, sprockets, gears, to 60″
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Two 18″x20′ trough belt conveyors and frames

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1—Farrel Jaw Crusher 10″x20″.
1—Williams No. 20 Slugger Hammer Mill.
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**Rebuilt**

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1—Northwest, Model 25, ¾ yd. Crawler Shovel or Crane, 6 cyl. gasoline engine.
1—General, ½ yd. Heavy Duty Crawler Shovel, Hoe or Crane, 6 cyl. gasoline engine.
1—Bay City, Model 25, ½ yd. Shovel, Hoe or Crane, Crawlers, 6 cyl. gasoline engine.
1—Bay City, Model 20, ⅜ yd. Shovel, or Hoe, Crawlers, 6 cyl. gasoline engine.
3—Bay City Tractor Shovels, Hoes or Cranes, ⅜ yd. ¾ swing, 4 cyl. gasoline engines.

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**JAW:** Acme 10x20, 14x26, 14x28, 16x42, 16x32, 18x22, 25x40, Eagle 20x36.
Cedar Rapids 10x20, 20x36, 25x40, Farrell 10x20, 13x30, 14x36, 18x36, 36x48, Buchanan 36x42, Good Roads Reliance 15x30, Traylor 18x36, 24x36, Allis-Chalmers 30x18, Good Roads 10x30, Telsmith 18x32, Champion 1630, 1040, 1236, 1530.
**GYRATORY:** Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36", Gyrasphere, 18", 28", Interstate Telsmith, Telsmith 5H, 10-B, 13-B, 16-B, Kennedy Van Saun 7, 19, 23½-S, 37, Traylor Ty 1¾", Ty 2¼", T-4½".
**ROLL:** Allis-Chalmers 54x24, Diamond 40x22, Pioneer 30x18, Telsmith 24x16, McLanahan & Stone 18x42; 24"x18". New Holland 24x16.
**HAMMERMILL:** Size 4 Williams Jumbo, Pennsylvania 8X3, 22x22. Cedar Rapids 20x33, Jeffrey 36x42, Jeffrey 36x24, 36x60, Dixie 3650.
**BALL MILL:** Allis-Chalmers 4'x6', 5'8"x18', Kennedy Van Saun 7'x5'. New 4'x4'; Hardinge 6'x6'; Colorado Iron Works 5'x6'; Marcy No. 64½.
**ROD MILL:** March 2'x6', 3'x8'. Allis-Chalmers 4'x8', Hardinge No. R 206.
**PULVERIZER:** Williams 30 Slugger, No. 3 Jumbo.
**TUBE MILL:** Smith 16R 5'6"x20'. Denver 3'x8'.
**PEBBLE MILL:** Hardinge conical, Abbe 6'x15'.
**DRIERS:** McNeil 5'x50'. Hardinge 90"x60'. Cumner 66"x50' Perkins 8'x70'. 10'x90'.

## TRANSIT MIXERS

2—REX 5½ yd. horiz: on LF. Macks. New 1947.
2—SMITH Hi-discharge 5½ to 7 yd. on LF. Macks. New 1949.
1—REX truck mixer, 4 yd. T7 No. 407, Mack 6BW.
1—JAEGER 4 yd. horizontal on Int. HB-12.
3—REX 5½ yd. horizontal separate engine driven.
1—SMITH MOBILE, No. 5 Mixer Model 405.
1—REX 6 yd. agitator on Diamond T chassis.

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Acme 5'x12' Revolv. Scrub-Scalp Screen.
Niagara 2 deck 4'x10' vibrating screen.
Selectro 3 deck heavy duty type screen.
Pioneer 4'x10' Scalping Screen. New 1946.
Robins 4'x10' double deck.
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Pioneer 4'x8' double deck.
Dorr 8'x26'8" Type DSD. 2'x15" Type SSFR and 3'x15' Type SDFR. Classifiers.

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Sauerman Slack line 1 yd. complete with Jaeger Diesel hoist. Practically new.
Sauerman 1½ yd. 70' mast 150 HP Elec. Hoist.
Sauerman 1 yd. with Waukesha gas hoist.

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Cat. D8 Ser. 2U with bulldoner DDPCU.
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C-P 500 CFM Diesel portable.
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Mixermobile plant. Complete for full operation.

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New Kinney 600 gal. skid mounted.
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B G model 848 Bit Concrete Mixing.
Cedar Rapids PA complete., Excellent.
Cummer, asphalt diesel-elec. 100 T P H.
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Cedar Rapids Two Unit Mobile Crushing
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Morris 10" elec. with cutter. Steel hull—40'x9'x5'.
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One complete Hardinge dry grinding unit, 2'x8" mill. Excellent Condition, includes both steel balls, pebbles and silex lining, needs only to be connected to power line. Suitable for Laboratory.

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15'x20' straight side, 7' cone.
10'x15' straight side, 10' cone.
7'8"x11'6"x17'3" (2).
8'x8'x14' with 4' U bottom (2).
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11' centers, 4"x6" buckets.
22' centers, 4"x6" buckets (4).
30' centers, 4"x6" buckets (4).
40' centers, 4"x6" buckets.

## CLASSIFIER

Dorr, duplex, 4'x20'.

## BELT CONVEYORS (Troughing)

104 ft. centers 14" w/structural (1).
24 ft. centers 14" w/structural.
13 ft. centers 14" w/structural.

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Syntron, vibra-flow, type F-350.
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Hummer, screen, 3'x10'.

## KILNS, COOLERS, DRYERS

3'x25'x⅜" shell, riveted (2).
4'x16'x⅜" shell, welded portable (1).
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6'x60'x5/8" shell.
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6500 gal., 76"x27'10" TANK CAR TANKS.
13,500 gal., 10'x21'6"x1".
15,300 gal., 9'x32'x5/16".
16,200 gal., 10'x6"25'x¼".

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INDUSTRIAL RUBBER PRODUCTS FOR EVERY PURPOSE

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**We have 8 to 48**
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**TOUGH COVERS**—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulcanized to the carcass to assure utmost performance, economically.

**STRONG CARCASS** — Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation.

**FLEXIBILITY** — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following desirable features; troughs easily, runs true on all idlers, gouge resistant, excellent for long and short hauls and slope installations.

*Avoid delays in your production schedules!*

We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches.

| Width | Ply | Thickness Top Cover | Thickness Bottom Cover | Type of Duck Carcass |
|---|---|---|---|---|
| 8" | 4 | 1/16" | 1/32" | 28 Oz. |
| 10" | 4 | 1/16" | 1/32" | 28 Oz. |
| 12" | 4 | 1/16" | 1/32" | 28 Oz. |
| 14" | 4 | 1/16" | 1/32" | 28 Oz. |
| 16" | 4 | 1/8" | 1/32" | 28 Oz. |
| 18" | 4 | 1/8" | 1/32" | 28 Oz. |
| 20" | 4 | 1/8" | 1/32" | 28 Oz. |
| 20" | 5 | 1/8" | 1/32" | 28 Oz. |
| 24" | 4 | 1/8" | 1/32" | 28 Oz. |
| 24" | 5 | 1/8" | 1/32" | 28 Oz. |
| 26" | 5 | 1/8" | 1/32" | 28 Oz. |
| 30" | 4 | 1/8" | 1/16" | 32 Oz. |
| 30" | 5 | 1/8" | 1/16" | 32 Oz. |
| 30" | 6 | 1/8" | 1/16" | 32 Oz. |
| 36" | 6 | 1/8" | 1/16" | 32 Oz. |
| 42" | 5 | 1/8" | 1/16" | 32 Oz. |
| 48" | 8 | 1/8" | 1/16" | 32 Oz. |

INQUIRE FOR SIZES NOT LISTED.
ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK

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*of every description*

TWISTED STEEL
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1-1/2" to 54" DIAMETERS

Shanks and Sockets to meet your specifications

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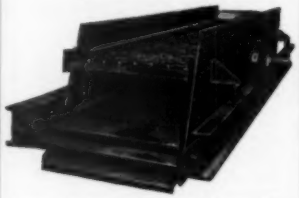
## CONVEYORS — IDLERS
## FEEDERS — CRUSHERS
## Guaranteed Equipment
## Immediate Shipment

**VIBRATING SCREENS**



Heavy duty eccentric shaft types. One to five decks. Screening sizes from 3'x8' to 5'x14'. Priced from .....$1573.00
Eccentric weight types. 1 to 3 decks. Sizes 2'x4' to 3'x8'. Priced from $479.00

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All steel. Interchangeable with other well-known makes. Replaceable precision ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible.
3-roll troughing idlers for 14", 16", 18", 24", 30", 36", and 42" belt widths. Priced from $22.00. 1-roll return idlers for 14" to 48" belt widths. Priced from $8.50.

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Flat belt type bulk material conveyors. Any length, belt widths to 48". Prices from .....$726.00

**CINDER, PUMICE, PERLITE CRUSHERS**

10 to 20 tons per hour capacity $ 479.00
25 to 50 tons per hour capacity 1144.00
Complete with hopper

**TRUCK SCALES**

15 Ton Truck Scales .....$545.00
20 Ton Truck Scales ..... 617.00
26 Ton Truck Scales ..... 684.00
Other scales of 50 ton capacity. All truck scales complete with structural steel weigh-bridge. Replacement parts for most all makes of scales.

**ACCESSORIES AND PARTS**

We have large stocks of belting, idlers and parts for scales, bonded screens, crushers, and conveyors. Phone us your order.

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**Bonded Scale and Machine Co.**
**128 Bellview Columbus 7, Ohio**
**PHONES:**
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## SELL
## SWAP BUY

100,000 Pressed Steel, Aluminum and Cast Iron Pallets.

**In Stock**

| *Size* | *Kind* | *Price* |
|---|---|---|
| 3" | Steel | 28c ea. |
| 3" | Steel | 32c " |
| 4" | Steel | 38c " |
| 4" | Aluminum | 38c " |
| 4" | FC George Welded | 25c " |
| 6" | Steel | 49c " |
| 8" | Steel | 52c " |
| 8" | FC George Welded | 35c " |
| 8" | Aluminum | 52c " |
| 8" | Steel | 35c " |
| 10" | Steel | 65c " |
| 12" | Steel | 85c " |
| 12" | Cast Iron | 45c " |

### BLOCK MACHINES

1—#7 Joltcrete Plant Complete—$6000.00. Consists of #7 Joltcrete Stearns Skip. Kelly Mixer, 2500—8", 3000—4", 1000—12".

1—Stearns Model A Clipper Strip—$995.00. per, Complete, Perfect Condition.

1—Kelly Tamper .....$300.00

1—#9 Joltcrete, with Air Off Bearer, Automatic Carriage .....$3500.00

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2—Gravely Block Machines, less motors, each .....$350.00

3—Stearns Clipper 4" Mold Boxes, includes Stripping Fingers and Feet, each .....$165.00

8—#7 & #9 Mold Boxes, various sizes, each .....$300.00

1—Brick Attachment, #7 Joltcrete and 1500 steel pallets .....$750.00

2—Air Offbearers, each .....$250.00

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**WE BUY COMPLETE CONCRETE BLOCK PLANTS**

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WAGON DRILL: Ingersoll Rand type D with X71 WD Drifter for 1¼" steel, with D-6-U hoist, mounted on steel wheels.

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DIESEL MOTOR: 122 H.P. Caterpillar D13000 complete with clutch V-belt pulley and spare parts.

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1—Diston Chain Saw, No. G 311 AY.
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1—70', 24" conveyor; 1—30"x40' conveyor
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Also six Wagon Drills.

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Model WK Allis-Chalmers Angledozer.
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5 ton Steel stiffleg derrick. New

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BINS & BATCHERS: 20 yd. capacity & larger
**MISCELLANEOUS ITEMS**
Barges, Bins, Buckets, Rollers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kiln, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

**MARIETTA ALEX T. McLEOD KANSAS**

---

1—Kent Maxecon, Type No. 7 Ring Roll Mill and Drive.
1—No. 4½ Champion Jaw Crusher, 10"x20".
1—No. 6 Champion Jaw Crusher, 12"x 26", rebuilt.
1—4½' Traylor Gyratory Crusher Type T.
1—New Holland Swing Hammer Pulverizer, 20"x10".
1—Acme Deep Frame Jaw Crusher, 24" x40".
1—McLanahan & Stone heavy duty Plate Feeder, 42"x96".
1—18" Link-Belt Apron Conveyor—9" pitch, 27' centers.
Bucket Elevators, open and totally enclosed, new and used, as is or rebuilt.

**JOHNSON & HOEHLER, INC.**
**P. O. Box 102 Lansdowne, Pa.**

---

**FOR SALE**

1—70 HP Marine type diesel engine
Link Belt pan conveyor 36"x22' centers
Fuller clinker cooling equipment for 10' kiln
2—Clam shell buckets

**OLLIE E. LAWRENCE**
**P.O. BOX 688 QUINCY, MICHIGAN**

---

6—12TD. 22 ton Euclids. P&H 255A ⅝ yd. shovel, age three years. 1055A P&H D.L. 80' boom, 3 yd. Also steel front 3 yd. dippers 255A—⅝ yd. P&H Diesel Crane, Buda Diesel, A-1 cond. with electric plant for magnet service. 7 Tournapulls and pans. 1¼ yd. Osgood shovel, K370 Link Belt dragline & Shovel. Lorain 75 & 77A shovels. 604 Lima shovel, std. front. 1½ yd., age two yrs. 54 Bucyrus-Erie shovel & DL. P&H 1055A shovel & DL. 3 yd. dipper. 2000 Lima shovel, 4½ yd. dipper, three yrs. One RD7 Tractor & 10 yd. dump wagon. TD 14 Int'l angledozer, one yr. 7D 24 Int'l Bulldozer, 2 yrs. 8D Caterpillar angledozer, one yr. 362 Marion shovel, 8 yrs. 1201 Lima shovel & DL.

**McCARTNEY MACHINERY CO.**
**Box 3105 Youngstown 12, Ohio**

---

**FOR SALE**

1—Blake Crusher—Jaw Length—24", Width — 15", Opening — 12"x16". 5" Shaft, Pulley 12" Face, 27" Dia. "A-1" Shape. Price: $750 00, F.O.B. our plant.

**UNION MINING COMPANY**
**2041 Oliver Building Phone: AT 1-9980**
**Pittsburgh 22 Pa.**

**WANTED**

To buy: ¾ yard Dipper Stick. Northwest Model 25

**MEGERT SAND & GRAVEL CO.**
112 West Fourth Street
Borger Texas

**Wanted to Buy**

Gravel Log Washer

**EMIL OLSON AND SONS**
Albert Lea Minnesota

**QUARRY FOR LEASE**

Sandstone Quarry of about 40 acres, in good location, for lease.
Product has passed state tests for riprap, crushed stone and building stone.
Weight of stone 170.35 lb. per cu. ft.

**ALLIE FOSS**
South Wales New York

For party interested in entering the concrete products manufacturing industry in California I have an unlimited supply of material, within 100 miles of Sacramento. Climate permits year round operation. Center of growing market for block, pipe, etc. Will make attractive proposition. Box J-64, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

**CORE DRILLING**
*—anywhere!*
"We look into the earth"
**PENNSYLVANIA DRILLING COMPANY**
Pittsburgh 20, Pa.

**New GENERATORS Surplus**

Diesel, Gasoline, or motor driven
1 to 1000 kw
Transformers — Motors — Switch Gear
Bought — Sold — Rented
**MIDWEST UTILITIES POWER EQUIPT. CORP.**
1272 W. Augusta Blvd. Chicago, Ill.
Phone, Everglade 4-4512

**RAILS — NEW AND RELAYING CARS — NEW AND USED — ALL TYPES**

**M. K. FRANK**
480 Lexington Ave. Park Building
New York City Pittsburgh, Penna.
105 Lake St., Reno, Nevada

**FOR SALE**

2—Rex 200D Pumpcrete electric drive with pipe and spare parts.
1—D-2 Bucyrus-Erie Diesel Crane and Shovel.

**MAHONEY-CLARK, INC.**
217 Pearl St. New York 38, N. Y.

**FOR SALE**

Sauerman Slackline Cableway.
1—Steel Mast 93'.
1—Sauerman Hoist and 2 speed motor.
1—1½ yd. bucket.
All necessary blocks and cable.
This equipment now in operation and may be seen. Available August 15, 1951.

**IRVING MATERIALS INC.**
Box 266 Greenfield, Indiana

**FOR SALE — CHEAP**

2—7½K Gates Gyratory Crushers. Performance data: 14" maximum size feed. Set with 2" opening—production 70 tons per hr. Set with 3" opening—production 130 tons per hr. Good operating condition. Additional spare parts.

**INDUSTRIAL DISMANTLING & SALVAGE CO.**
Easton, Pa. Box 332 Ph: 8253

**FOR SALE**

28 ft. Steel Atlas Conveyor, 24" belt.
3 H.P. Motor. Like new .....$995.00

**ARTHUR HARDY**
Manawa, Wisc. Tel. 1312

**FOR SALE**

NEW EQUIPMENT—Never used.
1—Eagle 7'x20' Paddle type Log Washer No. 1551.
1—4'x8' Cedarapids Double-deck Vibrating Screen.
Will sell at a reduced price.

**HORICON SAND & GRAVEL**
Horicon Wisconsin

**FOR SALE**

2—International KBR 14 10-ton trucks with 8 yard Heil Rock Body and 150 HP Cummins Diesel Engine.
New 1948. Excellent condition.
Price .....$5,000.00 each

**FRANTZ EQUIPMENT COMPANY**
30th and Wynnefield Avenue
Philadelphia 31, Pennsylvania
Tel. GReenwood 7-7200

**HAMMERMILL FOR SALE**

2424 Dixie Machinery Mfg. Co. non clog hammermill in excellent condition.

**THE ENGLISH MICA CO.**
Spruce Pine N. C.

**CONVEYOR BELT**

Approx. 800 ft. of used rubber covered conveyor belt, 53" wide, 6 ply, 3/32" top cover, 1/16" bottom cover, in 4 pcs., lengths 285 ft. 91 ft., 191 ft., and 230 ft.

**DALTON SUPPLY CO.**
Dalton, Pa. Phone Dalton 3-4601

**FOR SALE**

CRUSHER 1540 Champion Good Roads Jaw Crusher.
BOOM 65' for 80D Northwest.
TRUCK SCALE Howe 24 ton, 9'x24' platform.

**G. & W. H. CORSON, INC.**
Plymouth Meeting Pennsylvania

**FOR SALE**

Lake Crane.
Insley Concrete Form Bucket.

**CARIBBEAN EQUIPMENT CO., INC.**
P. O. Box 1221 Fort Lauderdale, Fla.

**FOR SALE**

1—Used 18"x36" Farrel-Bacon Jaw Crusher
1—Used 2" Denver Sand Pump
1—Used 12' diameter x 10' long Drum-type filter complete
2—Used Sauerman Dragline Units

**Basic Refractories, Inc., Maple Grove, O.**

**FOR SALE**

Sauerman three (3) cu. yd. drag scraper with electric motor and controls.

**ALLEGHENY SAND & LOAM CO.**
R.D. No. 1, Box 26781 Leechburg, Pa.
Phone 42-8342

**FOR SALE**

One (1) 24" x 36" Jaw Crusher.
One (1) Telsmith 3' x 12' Triple Deck Screen in good condition.
One (1) Bucyrus-Erie 50B, 2-yd. Shovel or Crane, has seen very little use.
One (1) Lorain "60" Shovel for parts, very cheap.

**WHITEROCK QUARRIES, INC.**
Bellefonte, Pa.

**FOR SALE**

36" Allis-Chalmers, 18-N, Gyratory Crusher for parts.
Shell Broken, Parts in Good Condition.

**WHITEROCK QUARRIES, INC.**
Bellefonte Pa.

**E. LEE HEIDENREICH JR.**
*Consulting Engineers*
*75 Second Street, Newburgh, N. Y.*
*Phone 1828*

Quarries
Crushing Plants
Cement Plants
Storage Methods
Operating Costs

*Operation*
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Precision Chemical Analysis of rare and common Minerals. Carbonate, Phosphate and Silicate Rocks.

**H. J. HALLOWELL, Consulting Chemist**
323 Main St. Danbury, Conn.

**CONSULT US BEFORE BUYING OR SELLING USED FARREL-BACON CRUSHERS SIZES 60"x48" to 10"x7"**

**As manufacturers of these machines we are in a position to assure you as to condition and operating ability. Send for catalog.**

149 Broadway **BACON-PIETSCH CO., INC.** New York 6, N. Y.

**FOR SALE**

Gravel plant at Xenia, Ohio, Greene County. Processes seven grades of material. Over 400 tons of material a day. Three man operation.

**WHITACRE & ROBERTS**
91 Walnut St. Xenia, Ohio

***FOR OVER 50 YEARS*** **A recognized service in the Cement Industry**

**We buy for Cash**

**Scrap Iron, Copper, Brass, Waste Materials, Surplus Machinery. We dismantle entire plants**

Allentown ***SOFRANSCY COMPANY INC.*** Pennsylvania



ALSO SEE READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT CLASSIFIED ADVERTISING IN CONCRETE PRODUCTS SECTION

### WANTED

Quarry Superintendent, must take full charge, organize own men, experienced in drilling, shooting, and setting up plants. Furnish references, age, salary expected and when available in first letter. Located in central Pennsylvania.

**Box J-77 ROCK PRODUCTS**
**309 W. Jackson Blvd. Chicago 6, Ill.**

### POSITION WANTED

Cement Plant Supt. or Asst., College graduate, 15 yrs. experience, cement plant and construction work. Now Plant Supt. Desire change.

**Box J-79, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.**

### WANTED

Position by Chief Chemist experienced in the manufacture of the five ASTM types of cement as well as Oil Well, masonry and plastic cements. Box J-53, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.





### POSITION VACANT

Young man with several years experience in the manufacturing end of the cement business is needed by a company having a wet process plant for opening as Assistant Superintendent. Submit full details concerning age, experience and qualifications to Box J-39 ROCK PRODUCTS.

**309 W. Jackson Blvd. Chicago 6, Ill.**

**Our Organization Knows of This Ad.**

### WANTED

Lime Plant Supervisor: Experienced in lime, cement or allied industry. Capable of taking charge of production and maintenance. Citizenship required. Location 70 miles north of New York City. Replies, which will be held in strict confidence should state age, experience, salary expected and when available.

**Box J-76 ROCK PRODUCTS**
**309 W. Jackson Blvd., Chicago 6, Ill.**

### OPENING FOR TRAMWAY MAINTENANCE MAN

We need a reliable tramway man, to maintain and supervise 13,000 feet of tram, with four transfer stations, in rugged Cascade Mountains. Must be competent to splice rope and socket lines, as well as operate hoists, and train and supervise hoist operators. In application give age, experience and salary.

**NORTHWESTERN PORTLAND CEMENT COMPANY**
**1702 Northern Life Tower**
**Seattle 1, Washington**

### WANTED

**CEMENT PLANT MAINTENANCE AND REPAIR FOREMAN**

Applicant must have past experience in position of at least equal responsibility. All replies will be held in confidence.

Salary will be commensurate with the applicant's experience. All of our employees know of this advertisement.

**Address Box J-73, ROCK PRODUCTS,**
**309 W. Jackson Blvd., Chicago 6, Ill.**

### WANTED

Young man as Assistant Superintendent for Stone Quarry and Crushing Plant. Some experience necessary. If satisfactory, to become Plant Superintendent within three months after date of employment. Location northern Virginia. State salary expected.

**Box J-75 ROCK PRODUCTS**
**309 W. Jackson Blvd. Chicago 6, Ill.**

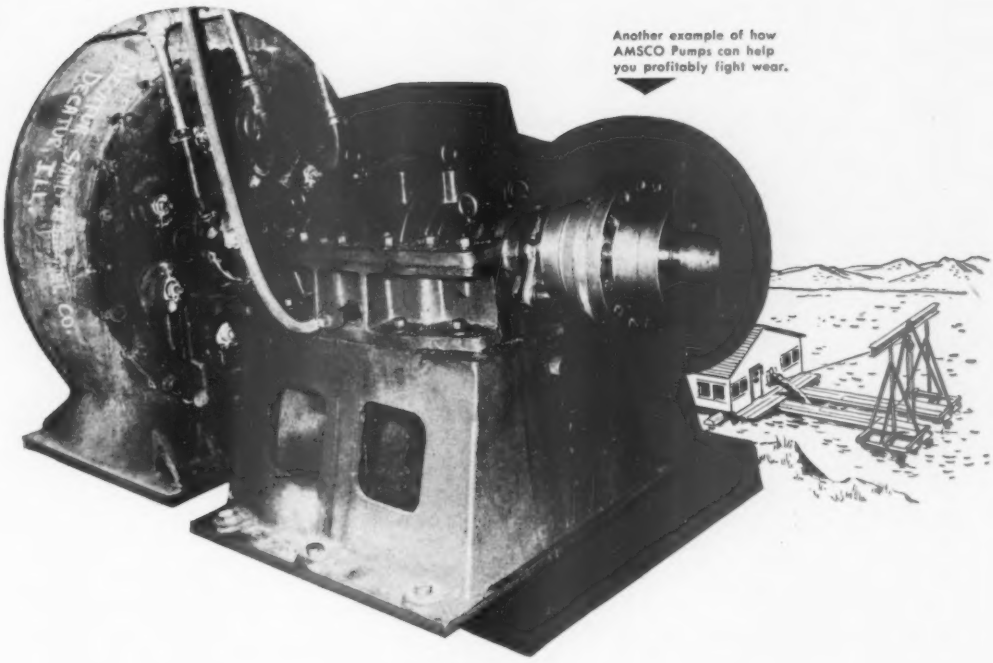
### WANTED

Master mechanic familiar with stone quarry equipment. Steady work. State age, give references and when available in first letter. Located in central Pennsylvania.

**Box J-78, ROCK PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.**

## INDEX TO CLASSIFIED ADVERTISING

# INDEX TO DISPLAY ADVERTISERS




# FOUND: $15,000 on a bearing stand

**How a switch to an Amsco Pump increased production — and lowered costs per ton**

The Decatur Sand & Gravel Co. in Decatur, Ill. now use an AMSCO Dredge Pump exclusively . . . because they found that even a rugged dredge pump is only as dependable as its weakest part. They formerly used another make of pump that in spite of all precautions averaged 15 days of down time per season—just because of bearing failure. Serious production losses resulted, and in an effort to increase tonnage, an AMSCO Dredge Pump was installed.

**RESULT? Not one bearing failure in the last 4 years! The trouble-free bearings on the AMSCO Pump increased tonnage by 11,000 tons . . . saved about $15,000.00 through higher production and lower upkeep over a 4-year period!**

This is the kind of dependable performance you can expect from AMSCO Pumps. From the suction to the driving coupling, they're built to give you lower handling costs per ton . . . *for a higher return on your investment.*

WHEREVER YOU PUMP MATERIALS THAT CAUSE IMPACT AND/OR ABRASION . . .

. . . find out about longer-lasting, dollar-saving AMSCO Pumps. There's a size and type for every type of materials handling service . . . made by the world's largest producers of Manganese Steel castings for all industry.

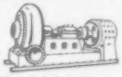
**AMSCO** controls impact and abrasive wear in 5 basic industrial operations:


Power Transmission


Mining & Excavating


Transportation


Crushing & Pulverizing


Materials Handling

**Brake Shoe** **AMERICAN MANGANESE STEEL DIVISION**

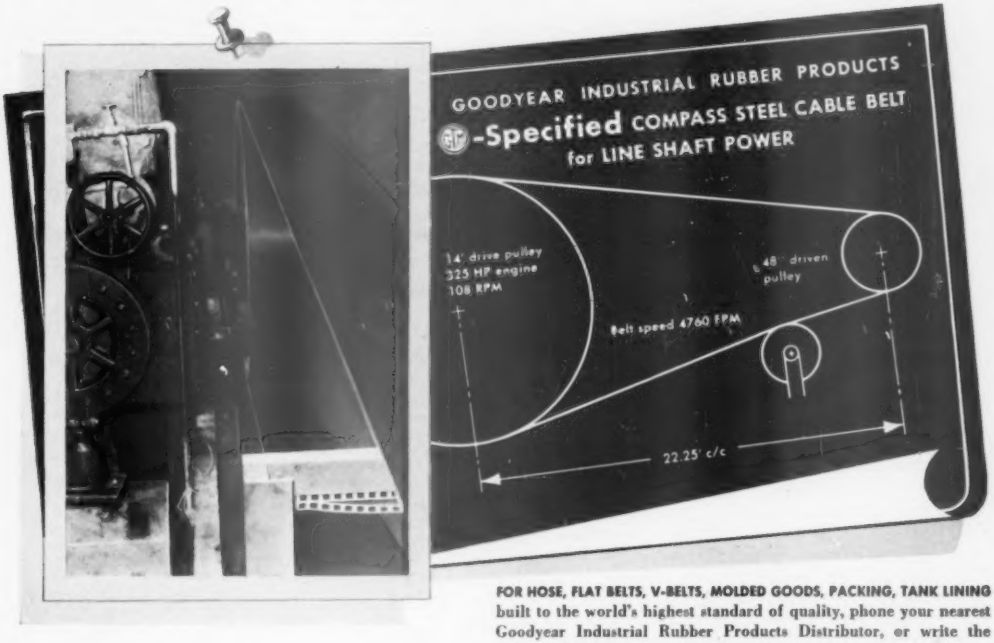
377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

# 6 TIMES LONGER SERVICE

**Standard flat belts on line shaft in stone plant lasted from 4 weeks to 6 months.**

**Goodyear's COMPASS STEEL CABLE BELT lasted *36 months plus without a single shutdown for take-up*—and was still in excellent condition when removed due to change in power source.**




**FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING** built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor, or write the G.T.M.—Goodyear Technical Man—Goodyear, Akron 16, Ohio.

# GOODYEAR

**THE GREATEST NAME IN RUBBER**